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October 10, 1972

SPECIAL SUPPLEMENT:
NIH Portfolio on Trauma Research

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NEWS & FEATURES From NIH October 10, 1972

Research Advances

SUBTLE BEHAVIORAL ABNORMALITIES MAY REVEAL METHYLMERCURY POISONING

Subtle deviations in the behavior of apparently normal offspring of mothers exposed to methylmercury may be one of the most sensitive indicators of mercury poisoning. In a study of mice exposed in utero to methylmercury, NIH grantees found that although these offspring appear normal, they behave abnormally when tested in an open field and evaluated in a swimming apparatus.

Currently, overt neurological damage is the only criterion used in officially recognizing a case of methylmercury poisoning and in setting standards for the allowable daily intake of mercury. The main symptoms of methylmercury poisoning noted in man include persistent numbness and abnormal sensations of the hands, feet, lips and tongue; lack of muscular coordination; vision and hearing impairment.

Investigators Joan M. Spyker, Sheldon B. Sparber and Alan M. Goldberg designed their study to determine if subtle behavioral, biochemical or neurological deviations should be considered as early indicators of mercury poisoning. Additionally, they wanted to determine if these subtle deviations were detectable during postnatal development of so-called normal offspring from treated mothers.

The investigators considered the fetus to be much more susceptible to the toxic effects of methylmercury than the adult. In the methylated form, mercury compounds are excreted very slowly. They pass through the blood-brain barrier and the placenta and accumulate in fetal tissues. Methyl-

(more)

mercury has a greater attraction for the central nervous system of the fetus than for that of the adult.

The grantees injected methylmercury into pregnant mice on the 7th and 9th day of pregnancy. After birth, offspring remained with their mothers until weaned at 21 days of age, therefore potentially exposing them to methylmercury during nursing as well as in utero.

The investigators could not grossly distinguish the prenatally exposed young from controls: no differences were found in average litter size or in appearance and weight of individual offspring. No differences emerged when the investigators compared control and treated mothers for possible variations in rearing of young, open field behavior and swimming performance.

A daily session in the open field consisted of first placing the month-old animal in the center of the field under a light-tight chamber for 15 seconds. Then, the researchers removed the chamber and recorded eight behavioral parameters during a two minute interval.

There was a significant difference between the way treated and control animals reacted with respect to four parameters: latency (time in seconds to move from center squares), defecation, urination and backing. (Although the differences in the other parameters did not achieve significance, in each case the mean response for the treated offspring was lower than for the control animal.)

When controls were placed in the center of the field, they moved forward and began to explore. Offspring from treated mothers, however, took a significantly longer time to begin exploration and when they did move

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about, a significant number showed a "highly unusual" backing phenomenon: the mice took three or more backward steps initially or during the test period. Several subjects traveled backward for more than half the test session. Only one out of 19 control animals (5%) exhibited this strange behavior, while backing was observed in half of the treated animals.

Even though all test mice were physically indistinguishable, the researchers report that they could discriminate the control offspring from the treated by means of evaluation in a swimming apparatus.

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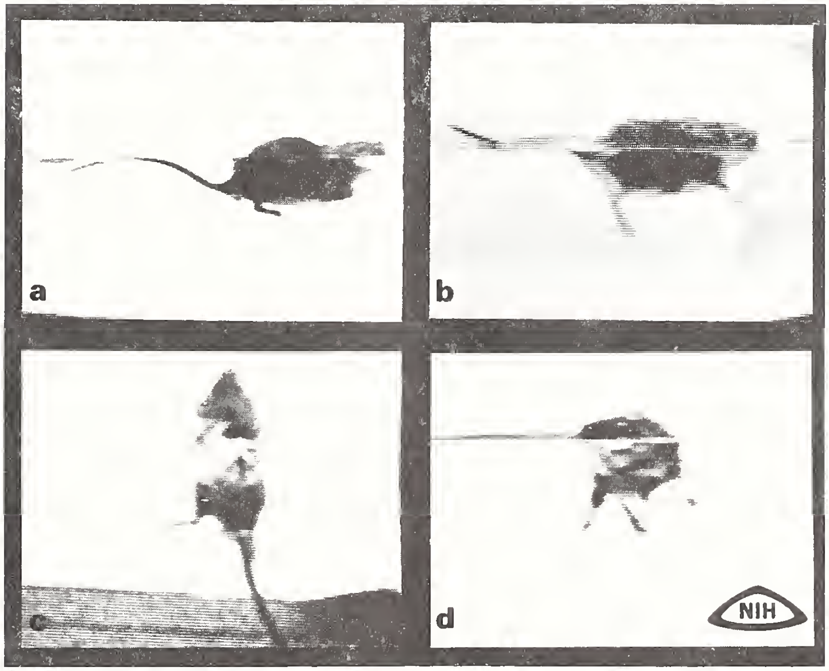

Controls swam with (a) front legs tucked, hind legs alternately kicking to turn or propel and tail under water for balance and propulsion. Characteristics of treated mice included frequent episodes of incoordination and impaired swimming ability such as (b) "freezing" in the water with all legs extended for periods up to two minutes; (c) floating suspended in a vertical position with only the head above water; (d) swimming with legs askew and inability to maintain normal orientation in water. (NIH Photo #906)

The 19 control mice adjusted to the water within one or two minutes: they stopped struggling to get out, assumed a characteristic posture and swam back and forth. Without exception, according to the investigators, the animals in this group soon appeared relaxed and well-coordinated--at no time did their eyes, nose or back sink below the surface.

The swimming behavior of a significant number of treated mice proved to be in direct contrast. Twelve of these mice showed one or more signs of neuromuscular impairment while swimming. Frequent episodes of "freezing" in water and floating motionless with all four legs extended and askew characterized the group; however, they were all capable of "normal" locomotion in the water.

In an attempt to correlate these behavioral differences with neurotransmitter enzymes, the brains of 12 control and 12 untreated male and female mice were examined at 60 days of age. The data revealed no significant difference between treated and control animals in regard to brain weight, protein and enzyme activity analyses.

As a result of these experiments, the researchers conclude that a need exists to examine subtle parameters when assessing the risks from methylmercury exposure. It seems likely to the investigators that many people with minor symptoms or subclinical damage have gone undetected.

Drs. Spyker and Sparber of the University of Minnesota Medical School and Dr. Goldberg of the Johns Hopkins School of Public Health reported their findings in *Science*, August 18, 1972. (Dr. Spyker is now at the University of Virginia School of Medicine.) Their work received support from the National Institute of Neurological Diseases and Stroke and from the National Institute of Environmental Health Sciences.

#

Research Advances

GINGIVAL BIOPSY MAY PROVIDE EARLY DIABETES DETECTION

Dentists treating periodontal disease patients may be able to aid in the detection of diabetes in its early stages, according to studies by Boston University dental scientists.

Dental investigators Steven E. Anapolle, John T. Albright, Floyd O. Craft and Lynda K. Haglund at the Boston University School of Graduate Dentistry recently reported detection of diabetes with a gingival biopsy. Their work was supported by the National Institute of Dental Research.

Diabetes involves both a metabolic defect--that is, an insulin deficiency--and vascular pathology. When the blood vessel involvement is severe, the thickening of the basement membrane in the small blood vessels becomes more noticeable. This thickening could be detected by dentists, allowing for an early diagnosis of the diabetes.

Dentists would use a biopsy of the gingiva as a relatively painless detection procedure. This procedure could provide microscopic evidence of early disease more readily than the muscle biopsy presently used. Not only is the gingival tissue readily accessible, but it also heals more rapidly than a muscle biopsy with relatively little discomfort.

Nearly 3 million people in the United States today have diabetes; less than half are aware of their problem and an additional 5 million have the inherited tendency toward diabetes that could lead to oral manifestations of the disease.

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In their study of both diabetic and normal mice, the Boston investigators focused attention on the blood vessels in the gingiva. Findings with the electron microscope showed that the membrane widths in diabetic animals were six to seven times larger than those found in the controls.

Based on their observations, the investigators conclude that the vascular disease of diabetes seen elsewhere in the body is also present in the gingival tissues. This thickening provides objective evidence to correlate increased incidence and severity of periodontal disease with diabetes.

Details of this study were reported in *Microvascular Research* 4:132-141 (1972).

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Prepared for NEWS & FEATURES From NIH by the National Institute of Dental Research Information Office.

Research Advances

PROSTAGLANDIN IMPLICATED IN SICKLE CELL ANEMIA CRISES

One type of prostaglandin may initiate or enhance a sickle cell crisis. With this identification of the chemical co-factor which triggers sickle cell anemia crises, scientists may now attempt to find drugs which will inhibit production of the prostaglandin that causes the crises in susceptible individuals.

Dr. Paul L. Wolf, associate professor of pathology and director of clinical laboratories at the Stanford University School of Medicine, along with Stanford biochemists Dr. Israel Rabinowitz, Dr. Malcolm Johnson and Dr. A.L. Willis, reported these findings in August at the meeting of the American Association of Clinical Chemists. This work was supported in part by a grant from the National Heart and Lung Institute to Dr. Wolf and Dr. Linus Pauling. Dr. Pauling did much of the early research on the molecular basis for red blood cell sickling.

In sickle cell anemia, a potentially disabling hereditary blood disease found primarily in black people, the red blood cells become elongated and shaped like crescents or sickles. Unlike normal round red blood cells, they have difficulty moving through the body's smaller blood vessels. As a result, the patient's blood flow is seriously impeded and the oxygen supply to various body tissues is reduced. The patient experiences severe pain, increased susceptibility to infection and often malfunction of body organs and disability.

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In tests the California grantees have conducted during the past eight months, small concentrations of the prostaglandin type known as E_2 were added to the red blood cells of sickle cell anemia patients.

"We found that the prostaglandin induced increased sickling in the red cells of the sickle cell anemia victims," Dr. Wolf explains. "On the other hand, no changes were observed when it was added to normal cells."

The investigators added urea--an agent known to reverse the process--to the solution and the sickling was reversed. Sickling and de-sickling were verified by observation with light scattering and spectrophotometry.

For several years, scientists have been searching for chemical co-factors which may trigger sickle cell crises. The Stanford investigators began to study prostaglandins--fatty acids manufactured in many body tissues which are capable of acting in various ways on most body tissues--when it became apparent that "certain symptoms of sickle cell crises, such as inflammation and fever, simulated symptoms which can be induced by prostaglandin injections."

Additionally, Dr. Rabinowitz notes, levels of prostaglandin in body tissues are elevated during or following infection, fever and during pregnancy. These events are associated with the initiation and increased incidence of sickle cell crises.

Previous studies have also demonstrated that prostaglandins make red cells more rigid, so they will not fit through the finer blood vessels. According to Dr. Johnson, "This, plus our own preliminary results, gave us

(more)

both direct and indirect evidence that it might affect the red blood cells of sickle cell anemia patients."

The next step in this research, according to Dr. Wolf, is to attempt to find drugs, perhaps prostaglandin analogues or antagonists, that can aid in the treatment of sickle cell anemia by inhibiting the prostaglandin type which causes sickling.

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NEWS & FEATURES From NIH October 10, 1972

News-Feature

BIOLOGIST TO STUDY POISONS IN CHESAPEAKE BAY JELLYFISH

A Washington, D.C. biologist will spend part of his time during the next three years identifying the poisons that Chesapeake Bay jellyfish inject into humans and other victims.

Dr. Richard S. Blanquet, Assistant Professor of Biology at Georgetown University, will conduct the investigation on two types of jellyfish, with the aid of a grant from the National Institute of Environmental Health Sciences.

Dr. Blanquet will study the jellyfish species Chrysaora quinquecirrha, which is common during summer and fall, and Cyanea capillata, the species which is more prevalent during colder months. Encounters with these organisms along beaches and in other aquatic recreational areas constitute a health hazard.

The jellyfish has an umbrella-shaped body and tentacles hanging down into the water. The stings are due to toxins in hairlike structures--called nematocysts--in the tentacles. Nematocysts vary in appearance and function, but they basically consist of a capsule containing an eversible thread continuous with the capsule wall at one end and stoppered by a flap or lid-like structure--called an operculum--at the other. Upon contact, the thread is forcibly ejected, depositing the toxins into the victim's skin.

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Human reactions to jellyfish stings range from skin rashes to death, depending on the species of jellyfish and the sensitivity of the individual. The more sensitive persons experience the symptoms of anaphylactic shock, which includes a soaring fever and difficult breathing. Dr. Blanquet's studies could provide a basis for more effective treatment of sting victims and a reduction of the hazard of the toxins to highly sensitive individuals.

Despite much research, the chemical make-up of the jellyfish toxin and the basis for its physiological effect is still not fully known. Dr. Blanquet intends to isolate and identify the toxins and to determine their hemolytic properties and effects on respiratory, cardiovascular and neural systems. He will also test their ability to release pharmacologically active substances--such as histamine, serotonin and bradykinin--from mammalian tissues. These substances are involved in a number of physiological conditions resembling those caused by jellyfish stings, including stimulation of pain.

Dr. Blanquet has had notable success in prior studies of developing techniques for isolating large quantities of nematocysts from the sea anemone--a flowerlike organism that attaches itself to rocks and pilings. Once isolated, the nematocysts were discharged in a defined medium so that the toxins, free of contaminating material, could be purified easily and identified with certainty.

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Jellyfish (Cont'd)

During the past year, he has developed techniques for isolation of large quantities of nematocysts from Chrysaora and for liberating and purifying the toxins. He has isolated two toxic proteins and has determined the molecular weight and amino acid composition of one of them. Preliminary neurophysiological studies, using frog sciatic nerve, showed that the toxin significantly reduces nerve impulse conduction. This apparently accounts for the rapid paralysis of organisms coming into contact with the tentacles.

#

Photo Feature

THE PORTABLE DENTAL PATIENT...

This model patient submits to prolonged dental treatment without a single complaint. Actually, the patient is a manikin head with synthetic but lifelike skin and a full complement of teeth that can be removed and replaced as necessary.

This patient simulator, developed by the NIH Division of Dental Health (DDH), was selected as one of the 100 most significant new technical developments of the year by the Industrial Research Editorial Advisory Board.
(NIH Photo #907)

(more)

The DDH Dental Manpower Development Center in Louisville, Kentucky, uses six manikin patients in training programs for expanded function auxiliaries and in short-term courses for faculty of dental school team programs.

Using patient simulator, the trainees gain familiarity with the four-handed dentistry techniques and equipment used in TEAM dentistry. The manikins enable them to practice the procedures they will later perform on real patients. (NIH Photo #908)

The number of dental procedures which can be performed on the simulated patient is almost unlimited because of the teeth that are removable and replaceable. (NIH Photo #909)

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Photo Feature

X-RAY CRYSTALLOGRAPHY MAY HELP FIGHT THE MAJOR DISEASES THAT PLAGUE MANKIND

Dr. Lyle H. Jensen, Professor of Biological Structure at the University of Washington, traces the course of the main protein chain through a model of a rubredoxin molecule. This model was developed from an X-ray crystallography study, supported by a grant from the National Institute of General Medical Sciences. The model is 100 million times larger than the actual bacteria and contains 54 amino acids in its chain. (NIH Photo #910)

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X-ray Crystallography (Cont'd)

Scientists may have a new and important weapon against diseases--such as various cancers--once the secrets of the complex inner structures of proteins are understood. The discovery of the configuration of these "building blocks of life" depends upon a method that has come into use in the field of medical research in only the last few years. The technique, called X-ray crystallography, penetrates the extremely minute, yet highly complex, structure involving literally hundreds of combinations of amino acids.

Dr. Lyle H. Jensen of the University of Washington School of Medicine uses the technique to plumb the depths of protein molecules too small to be viewed even through an electron microscope. A computer and a quantum counter to measure intensities of X-rays deflected by the protein molecule are also part of the equipment Dr. Jensen and his associates require. Their work received grant support from the National Institute of General Medical Sciences.

Proteins carry diseases as well as essential life functions in their amino acid composition. Dr. Jensen, a Professor of Biological Structure, believes that by knowing where each amino acid is located in the space of the protein molecule, the disease-carrying amino acid may be detected and isolated.

Complete mapping of the protein hemoglobin has helped scientists understand the sickling mechanism in sickle cell anemia and may lead to control of the disease. Dr. Jensen hopes that mapping other proteins will facilitate finding cures for other diseases, as well.

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X-ray Crystallography (Cont'd)

"If we can learn how nature is built, "he explains, "we can better understand how nature functions. If you want to fix something in a building, you have to know the floor plan."

The X-ray process takes place in a small room in the University of Washington Health Sciences Center. The room is filled with X-ray machines, quantum counters and computer desks--all to analyze a protein crystal which may measure no more than 15 thousanths of an inch in size.

The technique involves directing an X-ray beam through a crystal of the protein. As the X-rays intersect with the amino acids of the protein, the X-rays are deflected and measured by a quantum counter. The values from the quantum counter are then passed to a computer, which prints out a numerical electron density map. Dr. Jensen translates the figures into a contour map (which resembles a contour map used by hikers) to show the amino acid groups of the protein.

The electron density map is then translated into three-dimensional models of wood or plastic showing the long chains of amino acids. The complete structure of a large protein--such as insulin--with all its amino acids and subgroups, may take years to develop.

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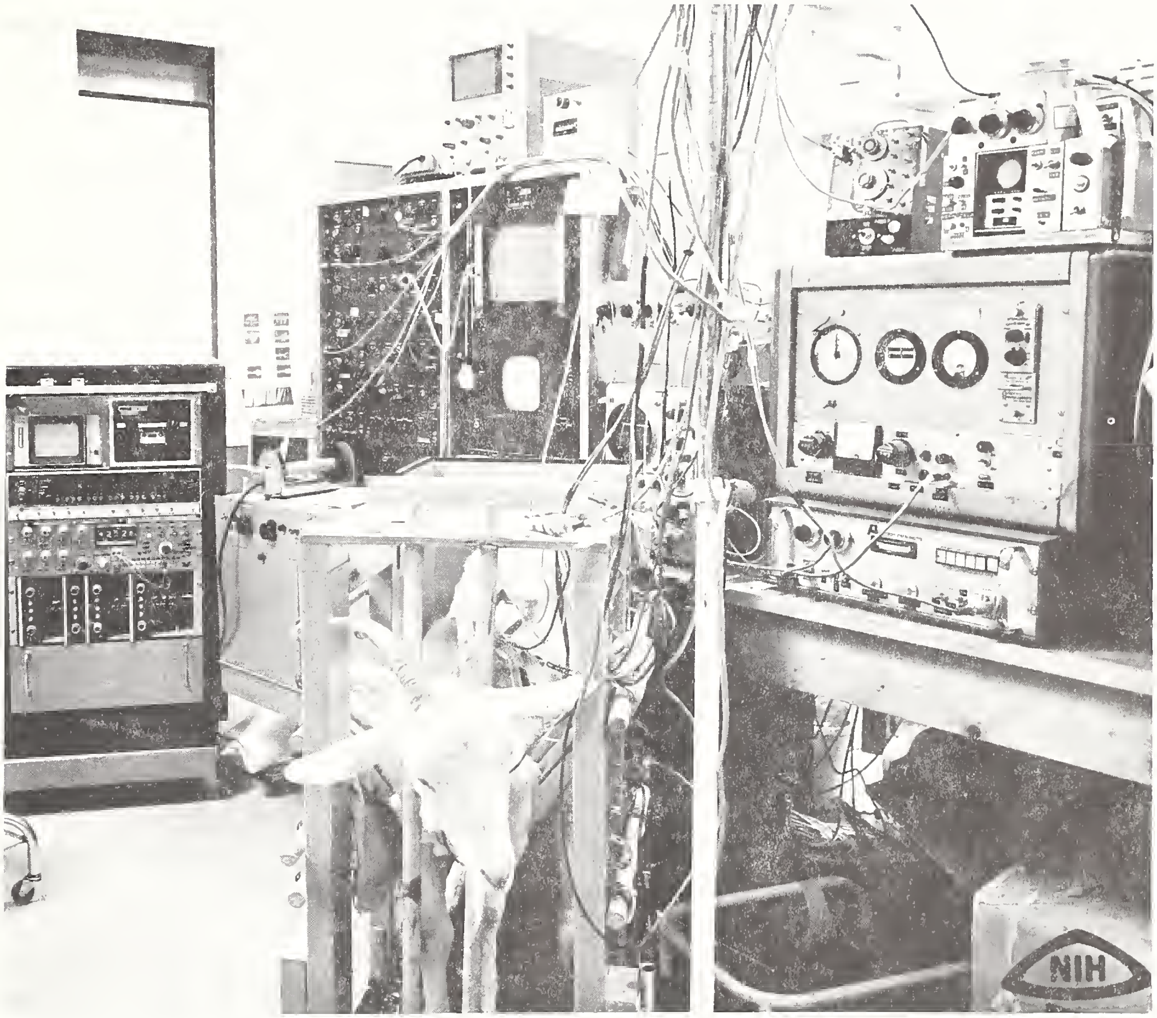
Photo Feature

COMPUTER WIRED TO GOAT MONITORS HEART'S RESPONSE TO OXYGEN SHORTAGE



Dr. Clyde E. Tucker, Associate Professor of Physiology at the University of Colorado Medical Center, is using goats to determine the extent to which a lack of oxygen contributes to abnormal heart functioning. The goat is well suited for this project because it is small enough to be handled in a home lab, on a high mountain peak or in an altitude chamber. Also, the animal's response to a lack of oxygen is similar to man's in many ways.

In this research project, supported by the National Heart and Lung Institute, special sensors that are attached to the goat's heart measure heart activity and a small computer processes the signals and performs mathematical calculations. The result is a sensitive indication of cardiac functioning. (NIH Photo #911)

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Medical News Tip

(Highlights of NIH intramural activities and extramural research projects which can provide many story leads for science writers.)

NIH PROVIDES GRANT SUPPORT FOR CHILDHOOD DISEASE RESEARCH--The biomedical knowledge required to prevent and treat many childhood diseases is already at hand, but for many more diseases, it remains to be developed. A large number of NIH extramural grants provide support for research relating to these diseases of the first five years of life. Grant support of research on diseases of infancy and childhood from fiscal year 1966 through fiscal year 1970, for example, provided over $300 million for projects explicitly concerned with health problems affecting infants and children.

The Research Analysis and Evaluation Branch (RAEB) of the Division of Research Grants recently compiled a report describing this grant support during the last 5 years.

The first part of the RAEB report identifies the research grant support covering specific disease or abnormality of early childhood, and analyzes NIH total research grant support of all childhood diseases. Included also is an analysis of the major health problems during this age period as causes of illness, hospitalization and death.

The second part of the report consists of four in-depth studies, each dealing with a particular disease area and identifying the research on some of the fundamental processes active in the disease. Sections of this part cover childhood diseases in four areas:

1. Renal Diseases
2. Cystic Fibrosis
3. Injury and Trauma
4. Lead Poisoning

(more)

For information about NIH grant support of research concerned with diseases occurring during the first five years of life, contact:

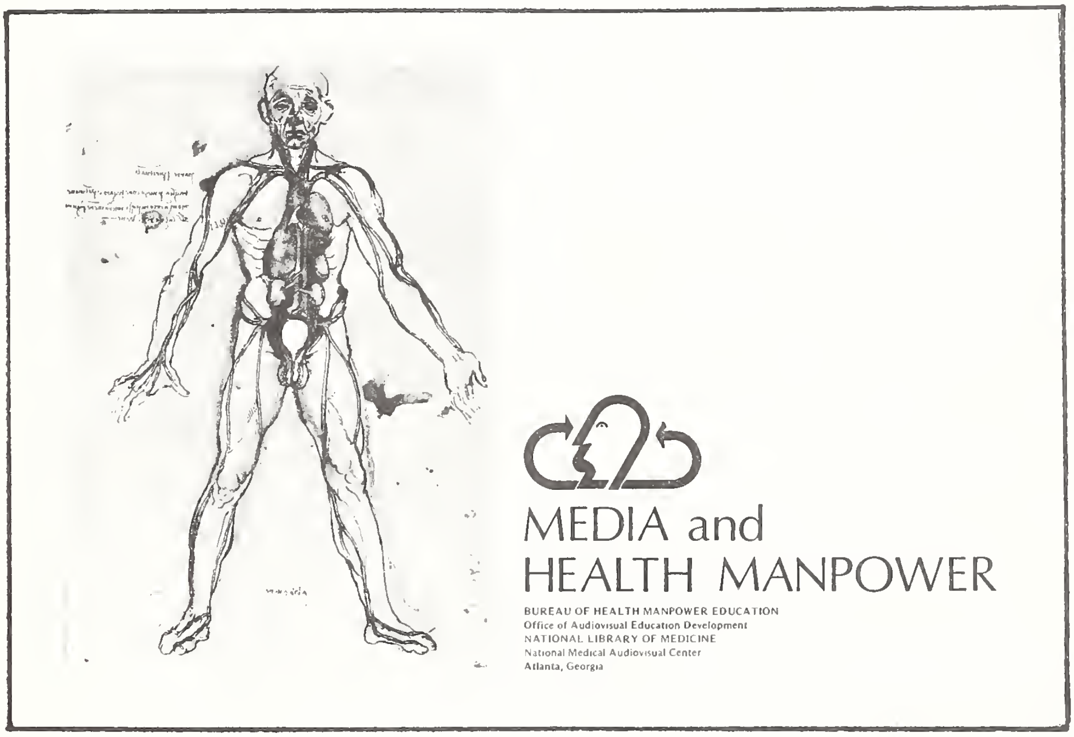
Information Office, DRG
Westwood Building, Room 435
Bethesda, Maryland 20014
Phone: (301) 496-7441

#

NEWS & FEATURES From NIH October 10, 1972

New Publication:
Media and Health Manpower

Effective use of audiovisual technology can be an important tool in correcting the serious inadequacies which now exist in the nation's supply of health manpower. New technology can multiply the effectiveness of the individual health instructor, possibly shorten the length of the curricula in the health sciences and even enable schools to produce higher quality graduates in a shorter time and in greater numbers than is possible today with conventional teaching techniques.



MEDIA and
HEALTH MANPOWER
BUREAU OF HEALTH MANPOWER EDUCATION
Office of Audiovisual Education Development
NATIONAL LIBRARY OF MEDICINE
National Medical Audiovisual Center
Atlanta, Georgia

The Office of Audiovisual Educational Development (OAED), a joint effort of the Bureau of Health Manpower Education (BHME) and the National Library of Medicine (NLM), serves as a focal point for efforts to investigate and

(more)

New Publication (Cont'd)

promote the uses of these new technologies in the development of audiovisual products for health sciences education. *Media and Health Manpower* explains how the Office draws upon the experiences of the Bureau to identify the major educational problems confronting the health professions and utilized the facilities of the National Medical Audiovisual Center of the NLM to devise effective solutions.

According to the publication, the Center contributes its facilities and staff for development, production and distribution of audiovisual products and its expertise for providing consultations and other assistance to medical institutions on audiovisual problems. The Bureau contributes the resources of programs--such as grant support and student financial assistance--for improving and expanding education in medical, dental, nursing and allied health professionals.

Some of the activities of the OAED include:

1. *Improving the quality and use of biomedical audiovisuals in medical schools*
2. *Providing information to help medical educators select or develop appropriate audiovisual materials for teaching*
3. *Assisting in building audiovisual capability into biomedical teaching facilities*
4. *Helping professional personnel gain knowledge of audiovisual production, utilization and evaluation techniques*
5. *Pooling self-instructional materials and producing additional ones, relying on the best resource of each school.*

(more)

Science writers may obtain a copy of *Media and Health Manpower* from:

Office of Audiovisual Educational Development
Bureau of Health Manpower Education
1600 Clifton Road, N.E.
Atlanta, Georgia 30333

#

News Releases Issued

(Summaries of NIH press releases. For a copy of any of these, please write or call.)

LUNG CANCER IN RATS--National Cancer Institute scientists have succeeded in producing lung cancer in rats by exposing them to products of cigarette smoke. The scientists, Dr. Mearl F. Stanton, Eliza Miller, Constance Wrench and Robert Blackwell, have developed a method in which, for the first time, tobacco products consistently produce in experimental animals the same kind of lung cancer that occurs most commonly in humans. Research on lung cancer has been severely hampered by the difficulty of producing the disease in laboratory animals. Dr. Stanton is planning to apply the new technique to test various fractions of cigarette smoke condensate, in an attempt to pinpoint specific substances which may be responsible for the cancer-causing activity. The method will also be used in testing experimental cigarettes, which may prove to be less of a cancer hazard to man than cigarettes now on the market.

PROFESSIONAL WOMEN--Women in high-status careers perceived their mothers as having steered them into professional life, perhaps because the mothers themselves were deeply ambivalent about traditional sex roles. This finding, from a retrospective study conducted in the Washington, D.C. area, was recently reported by National Institute of Child Health and Human Development scientists. Through questionnaires and interviews of 75 female lawyers, architects and physicians, the investigators focused on childhood activities and aspirations, parental characteristics and values and other aspects of childhood which seemed relevant to the development of motivations, interests and attitudes about work. The study findings suggest some interesting aspects of early development in successful professional women.

News Releases Issued (Cont'd)

MEDICAL TRAINING--Michigan State University will begin developing a pilot program to train medical students in physician shortage areas under a contract amounting to approximately $300,000 from the Division of Physician and Health Professions Education, Bureau of Health Manpower Education. The University will attempt to develop a program in which groups of eight to 10 students will receive their medical education in small communities not near a medical school. Teaching units would be associated with one or more community hospitals or other major health and educational facilities and stress primary care. The contract requires the University's College of Human Medicine to develop a curriculum that would enable students to meet the academic standards of conventional medical schools.

EFFECTIVE CONTRACEPTIVES--The National Institute of Child Health and Human Development has awarded an $844,057 contract to seek effective contraceptives from the many chemical compounds synthesized each year by industry, institutions and individual researchers. Under the contract, with the Mason Research Institute in Worcester, Massachusetts, candidate compounds will be selected on the basis of chemical structure and known biological properties. Investigations will cover a broad spectrum of anti-fertility agents, including new types of drug formulations such as tablets, injections and subcutaneous implants. Effects on both male and female fertility will be studied using a uniform program of drug evaluation in a variety of animal species.

News Releases Issued (Cont'd)

CANCER OF THE PANCREAS--A new National Cancer Institute research program will aid in the prevention and control of cancer of the pancreas, the fourth major cause of cancer death in the U.S. As a first step in the new program, researchers will explore ways of producing pancreatic cancer in laboratory animals, in an attempt to find a valid model for the human disease. Contracts for the research have been awarded to the Boston University Medical School, Case Western Reserve University School of Medicine, Dartmouth Medical School, St. Louis University, University of Chicago and the University of Kansas Medical Center. In a parallel line of research, scientists at the University of Tennessee and Wright State University will attempt to grow normal pancreati cells of humans and animals in laboratory test tubes, and then add cancer-causing chemicals to the cells in an attempt to produce cancerous changes.

CANCER OF THE PROSTATE--Another NCI research contract will support the first phase of a new attack on cancer of the prostate, the third most frequent cause of cancer death among males in this country. The award of $622,800 will support research to find a valid animal model for the human disease. Scientists will study the metabolism of the prostate under normal and cancerous conditions. Awards were made to the following institutions: Hazleton Laboratories Vienna, Virginia; Mason Research Institute, Worcester, Massachusetts; Microbiological Associates, Inc., Bethesda, Maryland; Papanicolaou Cancer Research Institute, Miami, Florida; Southwest Foundation for Research and Education, San Antonio, Texas; West Virginia University, Morgantown, West Virginia.

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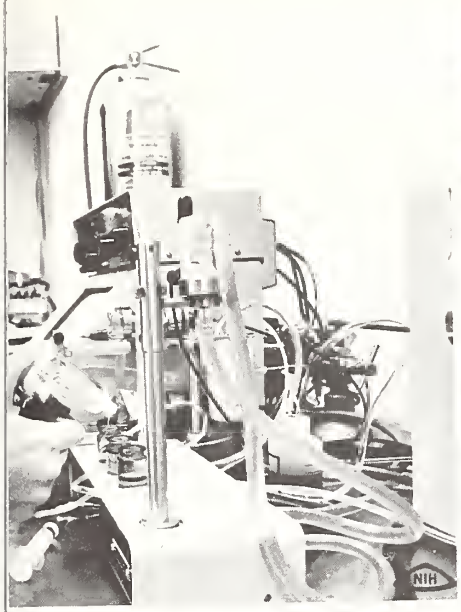

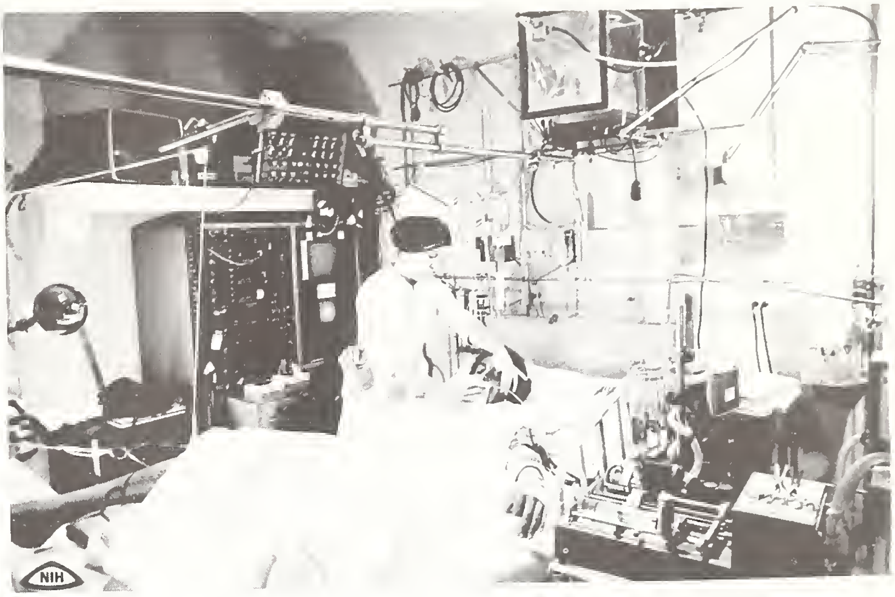

TRAUMA RESEARCH CENTERS

NEWS&FEATURES FROM NIH

NIH Portfolio on Trauma Research....October 1972

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE ■ Public Health Service ■ National Institutes of Health ■ Office of Information ■ Bethesda, Maryland 20014

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NEWS & FEATURES From NIH
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1. Genetics Research Centers....June 1972
2. Physician's Assistants Support....August 1972
3. Trauma Research Centers....October 1972

NTRODUCTION: NIGMS SUPPORTS IGHT TRAUMA RESEARCH CENTERS

y Emilie A. Black, M.D.

milie A. Black, M.D., is Chief, Clinical ciences, NIH National Institute of eneral Medical Sciences. Dr. Black ntered the Federal Government in 1968 ollowing 19 years in the private ractice of pediatrics. She also erved previously in the District of olumbia Department of Public Health.

rauma is called the "neglected disease" of modern society. It is the leading cause f death from one to 44 years, and the fourth leading cause of death for all age roups.*

pproximately one of every four Americans suffers an accident of some degree. There re over 100,000 deaths annually. Disabling injuries number 11,000,000 including 00,000 which result in some degree of permanent impairment. It is estimated that bout one out of every eight beds in general hospitals in the United States is ccupied by an accident victim. This exceeds the number of bed-days required to are for four million babies born each year or for all the heart patients, and it s more than four times greater than that required for cancer patients.**

lthough accidental death occurs in great magnitude, it is still looked upon with onsiderable indifference as a national concern. People consider injuries as ccidents to which most of them are immune.

s late as 1965, very little was done in the medical community to single out trauma ictims for the purpose of determining the extent of injury and the best methods of herapy.

few physicians, mostly surgeons, however, became deeply concerned about the high ortality rate of accident victims, and their curiosity was aroused as to why the atient died. This concern began to spread among the medical community. In 1966, he National Institute of General Medical Sciences, realizing the need for research n trauma, called together some of these physicians to discuss the proper approach o this serious matter. The outcome of this meeting was the development of a program n the Institute from which research funds could be granted for the study of trauma. he objectives of the program would be to reduce the mortality rate and disability o injured patients.

oday, NIGMS supports eight centers (in Albany, Boston, Buffalo, Cincinnati, Dallas, ackson, New York, and San Francisco) and 28 individual projects in trauma research. he investigators of the projects devote their time to the study of one particular spect of the body's response to injury. Some of the studies include the evaluation f fluid therapy in shock, metabolic changes of the traumatized patient, organ ailures, wound healing, pathophysiology of burns, septic shock, and computer ssessment of the injured.

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*Accident Facts, 1971 Edition

*Accidental Death and Disability: The Neglected Disease of Modern Society, National Research Council, January 1970

In the eight research centers, multidisciplinary studies are performed in the laboratory and on patients to provide a better understanding of the total response to trauma. The investigators have found that the events which lead to death may be characterized as a sequence of organ and system failures. These include cardiovascular, pulmonary, neurologic, metabolic, renal, immunologic, etc., and occur in varying sequence. In order to increase survival, the recognition and management of these failures must occur at a time when they are reversible. This requires the development of a vast base of knowledge about the mechanisms of the failures and their interrelations in the entire organism.

Research within the centers involves such studies as energy exchange and metabolism, cellular and subcellular changes in shock, pulmonary physiology and patient monitoring of the critically ill, sepsis and burns, and so forth.

The center is a laboratory for clinical research to study problems arising from trauma in man without interfering with his resuscitation. The basic aim of the program is to search for better methods of resuscitation through an understanding of the physiological and biochemical processes.

In severe trauma, the injury results in the breakdown of normal protective barriers leading to general infection, hemorrhage, and other lesions of stress which are threatening to life. Background information in these areas, therefore, becomes mandatory in order to determine and institute preventive and remedial therapy.

It is believed by the investigators that a successful search for a proper method of resuscitation depends not only on an understanding of the physiological and biochemical processes and their direct causes and compensating methods, but also on knowing the interaction and delays of the responses. It is on this tenet that the clinical investigation of the mechanisms of trauma, analysis of the data available, and the testing of therapy are based.

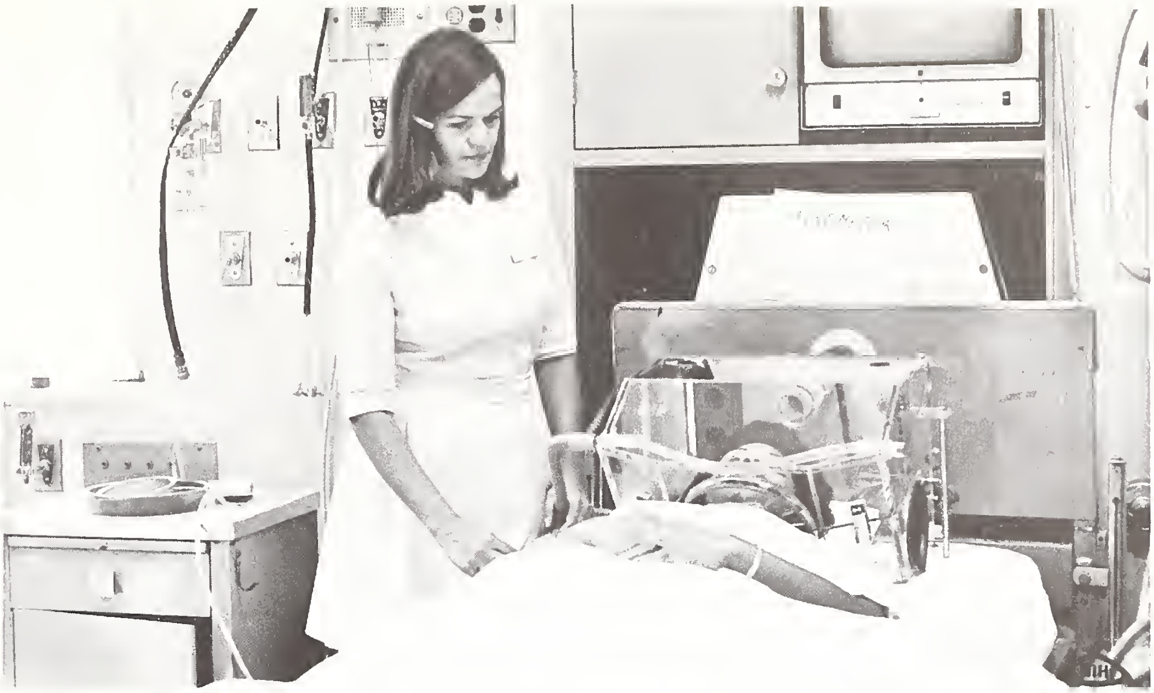
The Trauma Research Centers Program performs a triad of functions in the medical community by:

- performing research to extend the knowledge of the severely injured
- providing direct patient application of successful laboratory findings
- providing the opportunity for active teaching and training programs for nurses, physicians, and allied paramedical staff

The core of the current research falls in five basic areas: biochemistry, bacteriology, pathology, physiology, and data processing.

A surgical training program, within NIGMS, provides support by which young surgeons can be trained for research in surgical and physiological repair following injury. The Institute also supports Postdoctoral Fellows and Research Career Development Awardees, who are pursuing certain areas of trauma research.

Thus, progress has been made in the field of trauma. NIGMS has slowly overcome some of the handicaps by stimulating public awareness and medical interest. In the short time of its existence, the program has supported a modest amount of research on trauma, which has made marked advances in understanding the extent of injury and how best to treat it. However, much knowledge is still needed about the actual cause of the disabilities and deaths following injury.



NEW YORK, NY--The spirometer (upper photo) in the Columbia-Presbyterian Medical Center's Trauma Research Center continuously measures inhaled and exhaled air while the patient lies comfortably in bed. Use of the specially-adapted neck chamber causes less discomfort as the spirometry pattern of breathing capacity is determined. In lower photo, two physicians operate a computer-based patient monitoring system that enables them to establish a meaningful graph of a patient's vital signs. Five years of research at Columbia led to learning the best way to conduct patient monitoring. George Comunas, M.D., is operating the keyboard while Richard J. Gusberg, M.D., looks on. Grant support of the Trauma Research Centers is administered by the National Institute of General Medical Sciences of the National Institutes of Health. NIH is an agency of the U.S. Department of Health, Education, and Welfare. (NIH Photo #912 and #913)

Scientists in the NIGMS Trauma Research Center at Columbia-Presbyterian Medical Center are making measurements of gas exchange, energy production and changes in protein, and carbohydrate metabolic pathways to provide information for estimating the response to injury, the efficiency of wound repair processes, the composition and effectiveness of supplemental feedings after injury, and optimum dietary and exercise regimens for convalescence from injury.

They are also creating mathematical models for energy production and utilization pathways following injury, and are working on the acquisition of specific physiologic data to validate these models. For example, studies have shown that abnormalities in carbohydrate metabolism after trauma are not because of defective utilization rates (as would be seen in diabetes), and therefore studies are now being directed at the basis for production of large amounts of glucose rather than at a possible inability to use glucose as tissue fuel.

Studies of causes for the loss of body weight, which is often severe following injury, have been conducted in great detail in a few patients. It appears that unusual retention or excretion of water after injury relates to a change in tissue fuel from carbohydrate to fat. Some patients lost exceptional amounts of protein (ten percent of estimated active body protein) and are being followed to determine the metabolic significance of these losses during convalescence, and to guide the development of appropriate surgical nutrition.

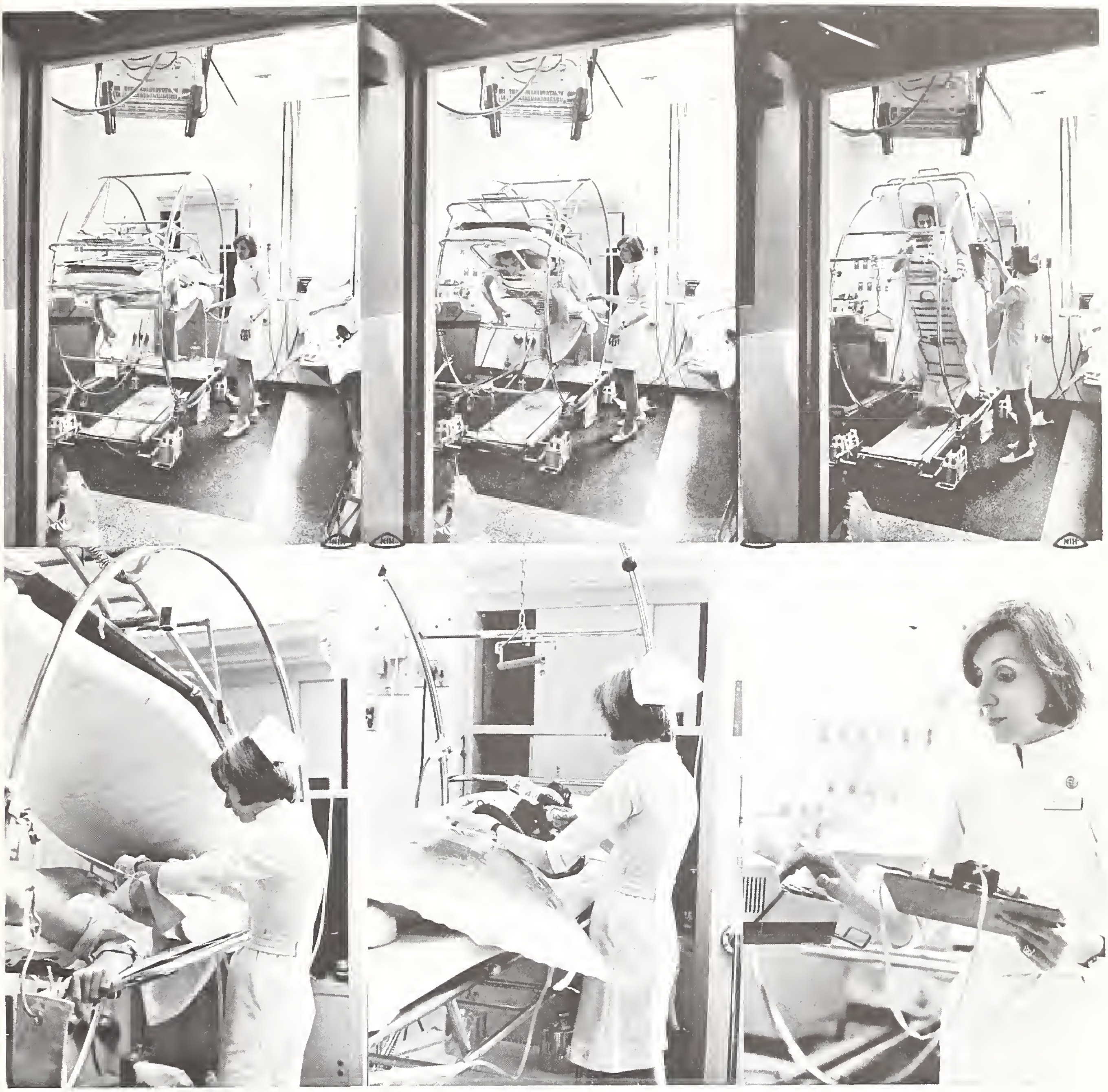
Radioisotope studies of pulmonary function after trauma have shown that such complications as shock or infection may cause greater accumulations of lung water than are seen after uncomplicated injury or surgery. This suggests increased permeability of lung capillaries as a basis for the respiratory deaths which so often follow trauma.

Studies of blood flow and oxygen utilization after injury suggest that as long as patients are able to increase their cardiac output, they appear to tolerate anemia adequately. However, when poor circulation or weakened cardiac contractions supervene, tissue oxygen demand must be met by extracting more oxygen from blood and in these circumstances even a little anemia can be dangerous. Such studies in burn victims suggest that a significant portion of the blood pumped by each heartbeat is not delivering oxygen to the tissues, but is being shunted past them, either because of the demands of the burn wound or because of changes in normal vascular channels in muscle.

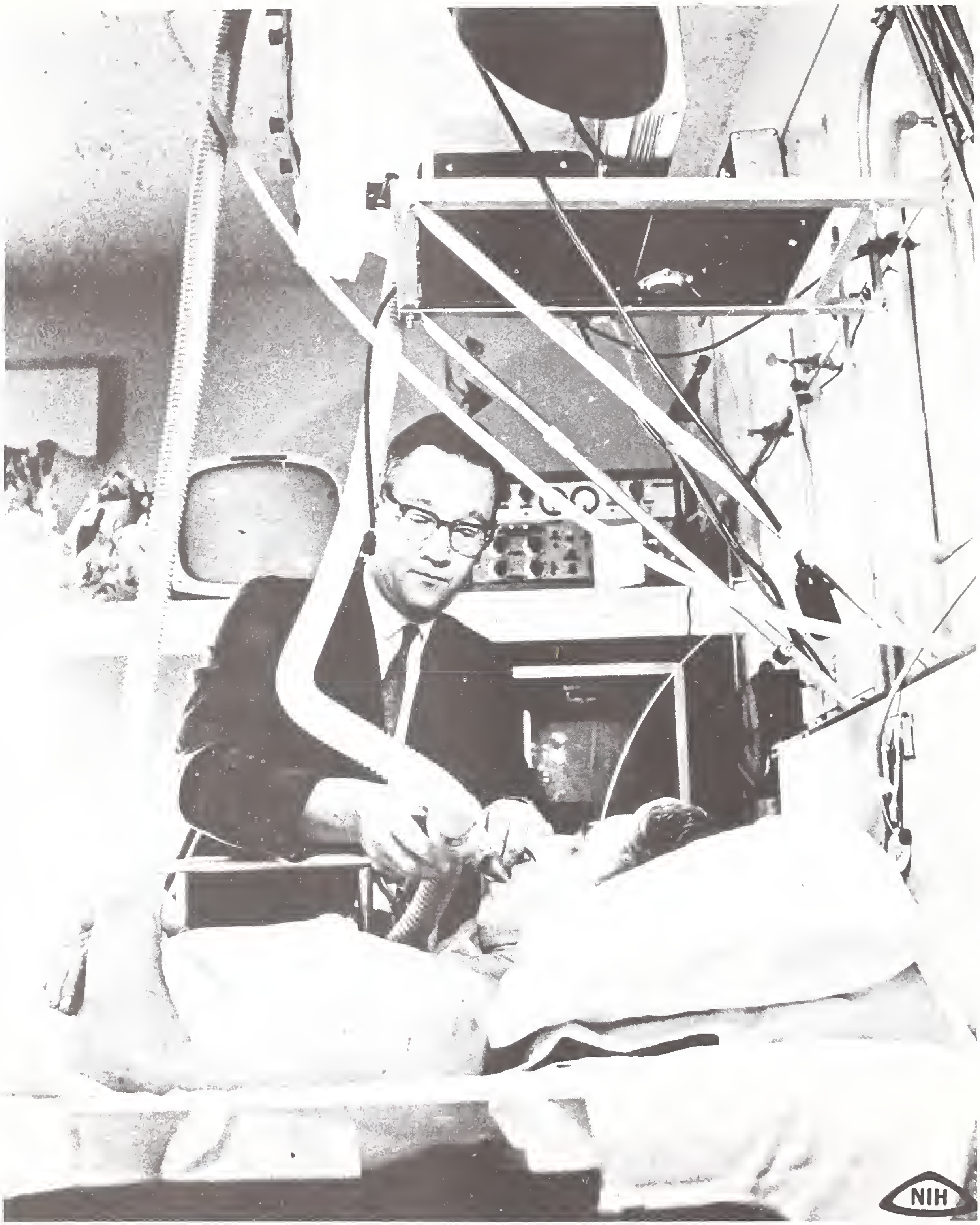
Since it has been shown that it is possible to keep infants and adults alive for long periods by intravenous feedings, the role of such feedings in the metabolic changes following trauma is being studied. Specifically, the composition of the feedings with respect to calories, protein, and carbohydrates is being determined, while the effects of various combinations of nutrients on tissue energy supplies and metabolic pathway are being compared.

Principal investigator is John M. Kinney, M.D.

Administration of Trauma Research Center grants is by the National Institute of General Medical Sciences of the National Institutes of Health. NIH is an agency of the U.S. Department of Health, Education, and Welfare.



NEW YORK, NY--The circle bed is one of many valuable tools used to study the changes in energy metabolism of a patient who was admitted to the Trauma Research Center with bullet wounds. Head nurse Carolyn Emig, R.N., is shown operating the circle bed. The Trauma Research Center is supported by NIH funds that are administered by the National Institute of General Medical Sciences. NIGMS is a component of the National Institutes of Health, an agency of the U. S. Department of Health, Education, and Welfare. (NIH Photo #914, #915, #916, #917, #918, and #919)



ALBANY, NY--During research into post-traumatic pulmonary insufficiency, Dr. Samuel R. Powers, principal investigator of the Trauma Research Center, is shown measuring the lung volume of a study patient hospitalized at Albany Medical College. Dr. Powers is professor of surgery at the College. Award of grants for the Trauma Research Centers is made by the National Institute of General Medical Sciences of the National Institutes of Health. Within the U. S. Department of Health, Education, and Welfare, NIH is an operating agency. (NIH Photo # 920)

Scientists in NIGMS' Trauma Research Center at the Albany Medical Center are investigating the causes of death from trauma following successful initial resuscitation. This includes the development of transducers, mass spectrography, and computer-based techniques to provide sequential detailed observations of oxygen exchange between lung and blood in injured patients. Approximately 150 patients have been studied in the center since its opening in 1967. Most of these victims have been young people, who were in robust health until the time of their accident.

The one-bed unit houses an impressive array of physiologic monitoring devices, many of them developed especially for this project by Rensselaer Polytechnic Institute (RPI) engineers. The information output of these devices is fed directly to an advanced computer where it is instantly analyzed and then displayed on a closed circuit television monitor in the patient's room.

Observations have led to a precise physiologic definition of the post-traumatic pulmonary insufficiency and to the definition of preventive techniques for respiratory management after trauma. The group of investigators has virtually eliminated this usually fatal complication in their severely injured patients.

This team explains the cause of death in post-traumatic respiratory distress syndrome as a failure of the body's various organs to receive an adequate supply of oxygen. The unit is designed to measure the function of the lungs, heart, and kidneys as they are involved in the utilization delivery of vital oxygen. This is achieved through the use of devices which monitor the quantity and rate of inspiration and expiration of air, the pressure across the surface of the lung which is necessary to move this quantity of air, the concentration of oxygen and carbon dioxide in each breath, blood pressure in the arteries and veins, and quantity of blood pumped by the heart. These and other measurements are continuously recorded and prepared for computer analysis.

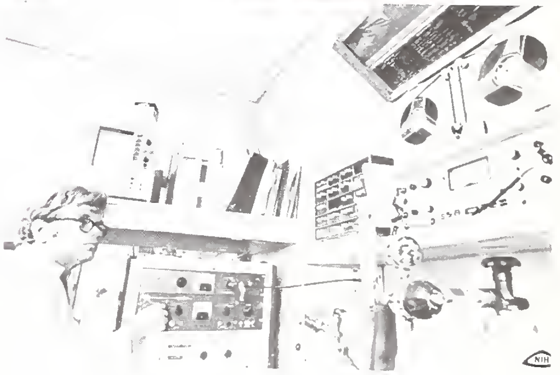
With instrumentation of this kind, the research team has identified the essential problem of acute respiratory distress as a marked decrease in the volume of gas in the lungs. Studies of methods to correct the syndrome once it has developed are now being pursued actively. Their approach to this problem has been one of hyperventilation, using mechanical ventilators at increased pressure to expand the lung, and thus prevent the usually fatal respiratory collapse.

Physicians associated with the Albany project believe that information obtained in their study over the past several years is helping substantially to reduce mortality following severe injury. Among the 100 or so patients, who may owe their lives to the care they received in the trauma center, are a jockey crushed by his falling horse during a steeplechase race at Saratoga Racetrack and a railroad employee whose legs were severed at the thigh when he fell beneath a freight car.

Also under way is the development of a true functioning interface between medical and engineering personnel at graduate student level, as well as in faculty and investigation-linked associations. These relationships provide medical students with considerable information about engineering capabilities, and in addition, enable engineering graduate students to move into a clinical setting with considerable appreciation of the special problems involved in applying engineering technology to acutely-ill patients.

Principal investigator is Samuel R. Powers, M.D., Professor of Surgery, Albany Medical School, Union University, and also Adjunct Professor of Bioengineering, RPI.

The National Institute of General Medical Sciences has awarded grants for Trauma Research Centers. NIGMS is a component of the National Institutes of Health, an agency of the U. S. Department of Health, Education, and Welfare.



ALBANY, NY--A team of physicians, college engineering professors, and computer scientists is credited with saving the lives of victims (left) of severe injury at Albany Medical Center's Trauma Research Center. They found a way to predict and prevent the respiratory failure accompanying trauma, or shock, that usually causes death within two to 15 days after injury. The method combines electronic detection, high-speed computer analysis, and timely medical treatment to prevent the onslaught of shock. Dr. Samuel R. Powers (right), professor of surgery at Albany Medical College and principal investigator, demonstrates (upper photo) one of the preventive measures: artificial ventilation of the lungs. In center photo, computer symbols and medical charts serve virtually as life lines, signaling onslaught of respiratory failure. Attending physicians are thus alerted to the symptoms in time to take preventive measures. In a room adjoining the Albany Medical College Trauma Research Center, Jonathan Newell, supervising engineer for the project, uses mass spectrograph (lower photo) to measure and record oxygen concentration in expired air of patient. Funds of the National Institute of General Medical Sciences are awarded for the operation of Trauma Research Centers. NIGMS is a component of the National Institutes of Health, which is an agency of the U. S. Department of Health, Education, and Welfare. (NIH Photo # 921, # 922, #923, and #924)

Background Statement: The Problem of Trauma

The field of surgery has a special concern for the problem of trauma. The treatment of wounds and the observations of the response of the patient to injury have formed a central theme of surgery since before the days of Hippocrates.

Trauma has become a massive public health problem to the nation, causing the greatest loss of productive man years of any disease at an estimated annual cost to society of $23 billion. A broad and determined effort is needed to reduce this loss, which will require the help of every medical specialty; but the ultimate responsibility for the care of the individual trauma patient rests with the surgeon. Improving the care of the trauma victim depends upon increasing medical manpower and research on the mechanisms and treatment of injury.

Certain areas of particular importance now include the choice of resuscitative fluids, blood storage and fractionation, changes in blood coagulation, acute surgical nutrition, and the understanding and control of infection in the critically-ill patient. In addition, the field of bioengineering and data processing offers additional breadth and sophistication to the design and conduct of research studies and the processing of information for patient care.

The NIGMS Surgery Training Committee in its recent report, "Status of Research in Trauma and the Critically Injured," recommends that:

* The cost of trauma to the nation be publicized.

* Additional effective programs to reduce this tragic loss be established.

* The relationship of trauma research to improved care of trauma victims be publicly demonstrated. The public must be educated to the importance of supporting laboratory research in trauma and of providing the facilities and environment to encourage non-clinical scientists to engage in trauma-related research.

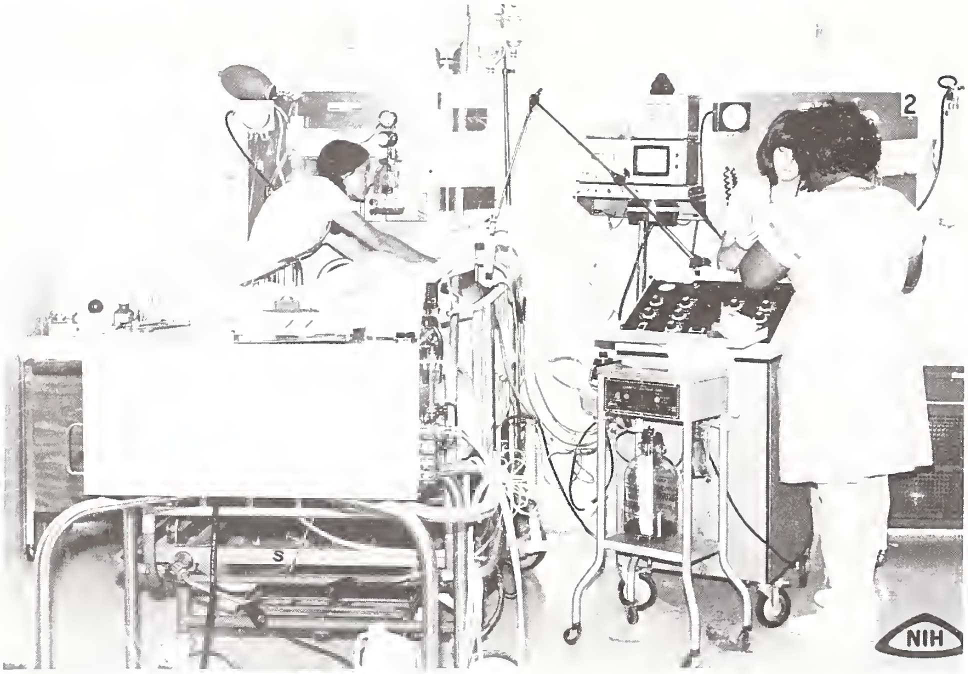
* New ways be sought to aid the correlation of laboratory and clinical research in trauma by support and encouragement of specific clinical trauma study units and by a wider utilization of selected beds on intensive care units for this purpose.

* Scientists concerned with the development of bioengineering and data processing be made aware of trauma as an important potential focus for multidisciplinary medical research, as well as an important opportunity for contributing to patient care.

* The teaching of trauma to undergraduate medical students and residents be improved.

* Legislative action be stimulated and guided to provide additional funds for trauma research and patient care as a major contemporary public health need of the nation.

The new horizons of research can return the historic function of the surgeon to the care of the wound--to the mainstream of the future of surgical care where the understanding of body dynamics will dictate the care of the trauma victim.



CINCINNATI, OH--This 38-year old male (upper photo) is a patient whose life has been prolonged through the research efforts of the investigators at the Cincinnati Trauma Research Center. He had multiple gunshot injuries of the colon, stomach, bladder, spleen, diaphragm, and pancreas which produced severe hemorrhage and profound shock. Postoperatively he developed renal failure and hyperpyrexia. The principal investigator of the Trauma Research Center is Dr. William A. Altemeier, Professor of Surgery and Chairman of the Department. Trauma Research Centers are a grant program of the National Institute of General Medical Sciences, a component of the National Institutes of Health. NIH is an agency of the U. S. Department of Health, Education, and Welfare. (NIH Photo # 925 and # 926)

CINCINNATI

Researchers in the NIGMS Trauma Research Center at Cincinnati General Hospital are studying alterations of basic host defense mechanisms following injury. They have found that the onset of life-threatening infection is related to an abnormality of the antibacterial function of the circulating neutrophils (scavenger white blood cells).

These cells which increase proportionately during infection, vary in their ability to kill bacteria, and the variation occurs in cycles. (The periodic variation is usually exaggerated during the stress reactions following trauma.) These cycles are being correlated with endocrine function and with levels of circulating antibody.

This group has standardized a method of measuring neutrophil function, and the results have led to predicting impending septicemia with a high degree of accuracy. Also in studies of antibodies and of neutrophil function, the importance of quantitative bacterial counts of wounds is emerging as an important clinical tool.

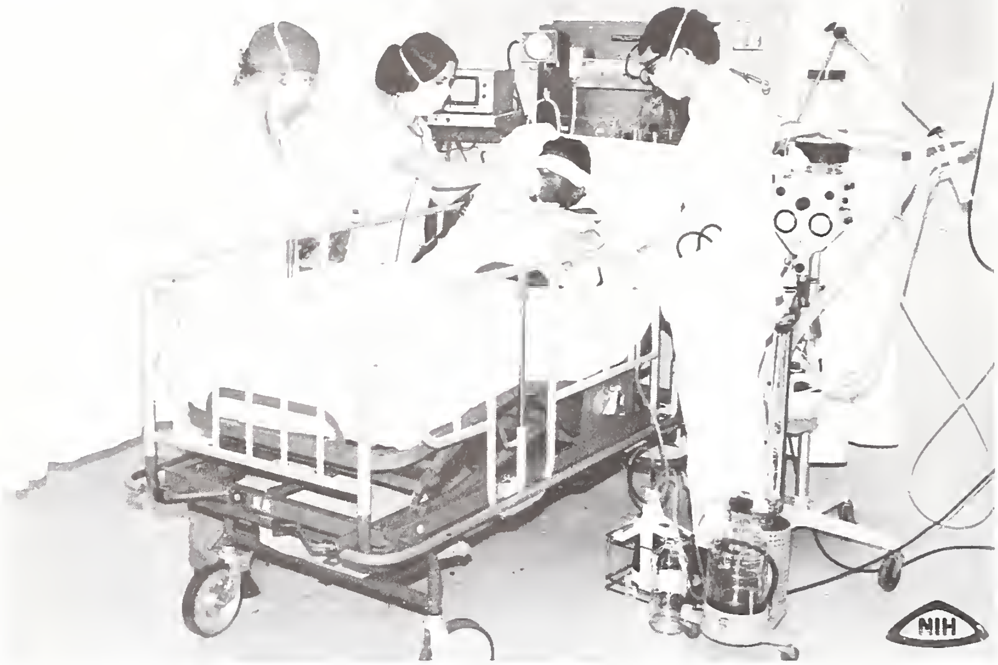
The researchers are finding that wounds of violence are particularly prone to infection because of gross contamination, cellular damage, and any appreciable delay in therapy. They believe that indiscriminate use of antibiotics along with altered host resistance permits generalized systemic invasion of bacteria. These bacteria, normally innocuous, (examples: Serratia and Candida) take on "L forms" following alterations of their cell walls. With early and continuous blood analyses, this group has been able to alter the course of the infection and thereby reduce death.

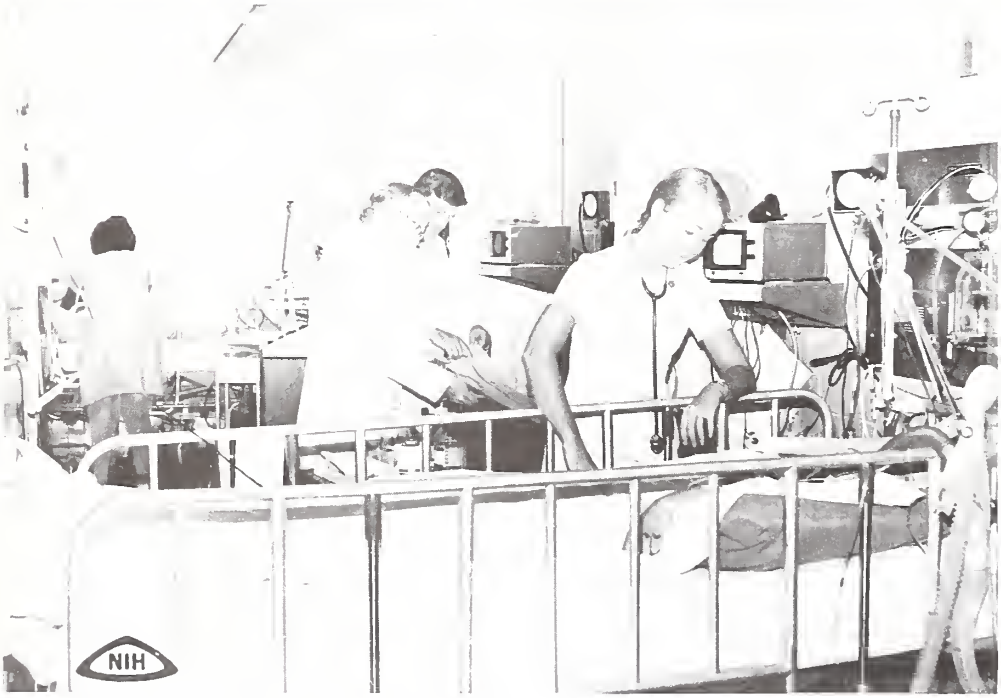
There has been development of special diagnostic techniques to detect the pathogenicity and toxigenicity of the anaerobes in all of their forms. Studies are under way to determine the methods by which anaerobes interfere with the action of the commonly used anticoagulant, heparin, and the importance of this phenomenon in the development of septic thrombophlebitis.

Also of importance is the identification of enzyme extracts obtained from cells at the site of injury which induce cell growth and can accelerate the healing process.

The principal investigator is William Altemeier, M.D.

The National Institutes of Health, through the National Institute of General Medical Sciences, is administering the Trauma Research Center grants. NIH is an agency of the U. S. Department of Health, Education, and Welfare.





CINCINNATI, OH--The Cincinnati scientists are making intensive laboratory and clinical studies on the causes and prevention of life-threatening infection following trauma. The study patients include: A 33-year old female (upper photo with multiple stab wounds of the chest and abdomen and resulting injuries to the lung, liver, and spleen requiring laparotomy with splenectomy, tube thoracotomy, and tracheostomy for respiratory insufficiency. In the lower photo is a male patient with gram-negative septicemia complicating multiple wounds of the chest, abdomen, and leg. Grant support of the Trauma Research Centers is administered by the National Institute of General Medical Sciences of the National Institutes of Health. NIH is an agency of the U. S. Department of Health, Education, and Welfare. (NIH Photo # 927 and # 928)

DALLAS, TX--Dr. G. Tom Shires (above) uses modern equipment to monitor the vital signs of patients in the four-bed research unit at Parkland Memorial Hospital, where clinical research is carried out on critically-injured patients, who are kept alive by the coordination of therapeutic needs with research discoveries. The National Institute of General Medical Sciences has awarded grants for Trauma Research Centers. NIGMS is a component of the National Institutes of Health, an agency of the U. S. Department of Health, Education, and Welfare. (NIH Photo # 929)

The research team in the NIGMS Trauma Research Center at The University of Texas Southwestern Medical School, Parkland Memorial Hospital, Dallas, is studying the measureable reductions in plasma volume and in extracellular fluid that are responses to injury. These changes in body fluid space are the key to successful restoration of circulating blood volume and to preservation of cellular function following trauma. They are particularly important after massive crush injuries and burns.

The scientists have devised an intracellular ultra-micro-electrode to study changes in permeability of muscle cell membranes following trauma. This device also aids in the evaluation of cellular metabolism elsewhere in the body.

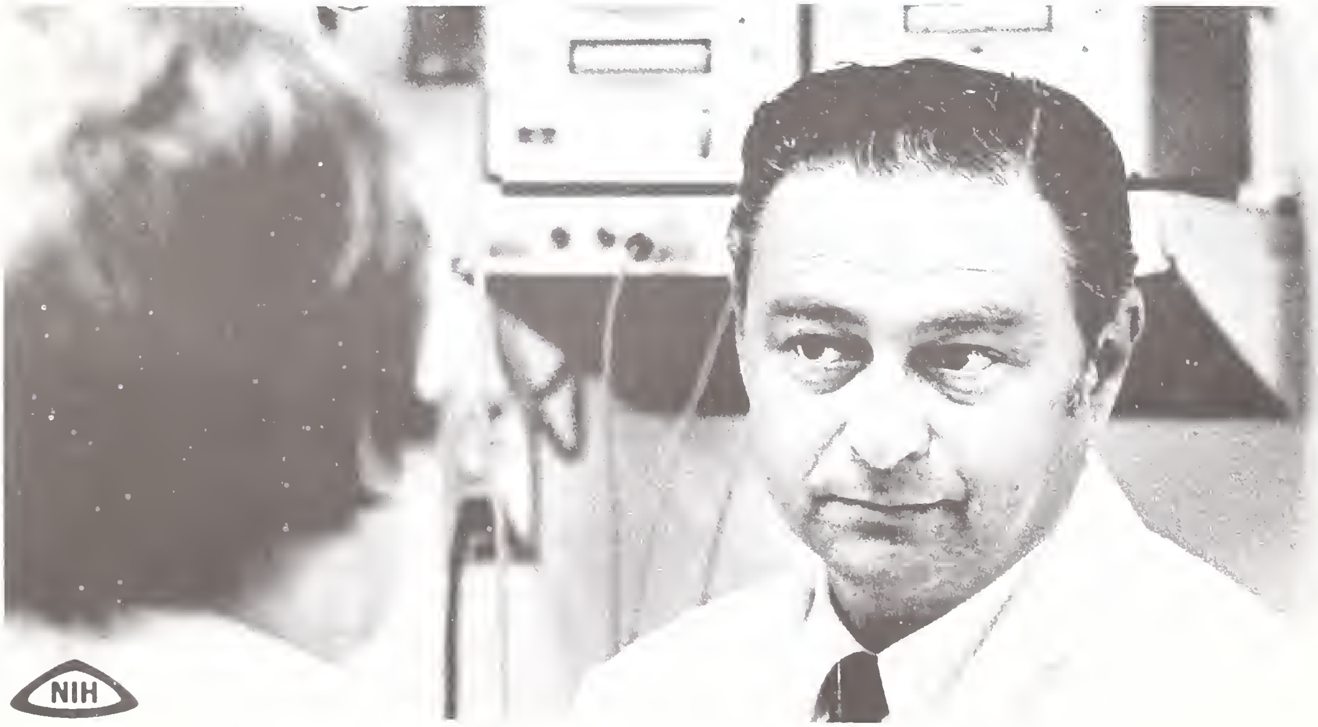
They are also measuring changes in electrolyte concentration of red blood cells as indicators of the clinical course of injured patients. Sodium determinations are made on the red blood cells in acute hypotensive states and found to be elevated in direct proportion to the severity of the injury. The elevation is not related to transfusions or medications and therefore is thought to be a reliable indicator of prognosis. The researchers are also investigating abnormalities in blood clotting pathways which may lead to widespread coagulation or severe bleeding.

Their investigations of changes in blood flow patterns to the kidney after injury are an attempt to explain the particular vulnerability of this organ to trauma.

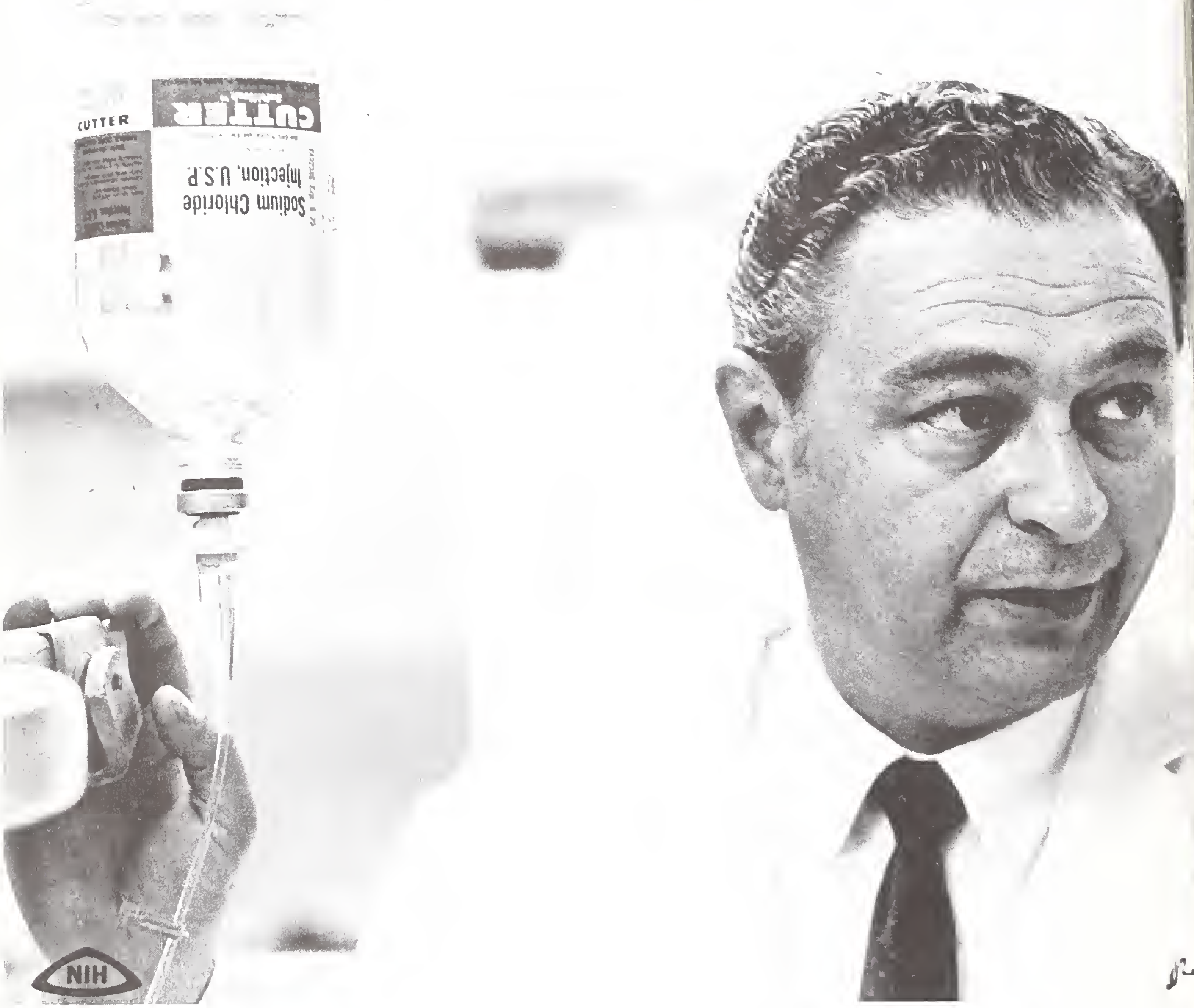
Despite apparent normal chest X-rays, these researchers have found pulmonary function to be impaired for several weeks post-injury. With the help of radioisotopes, they hope to determine the causes and extent of this decreased ventilatory function.

The principal investigator is G. Tom Shires, M.D.

Trauma Research Centers are a grant program of the National Institute of General Medical Sciences, a component of the National Institutes of Health. NIH is an agency of the U. S. Department of Health, Education, and Welfare.



DALLAS, TX--Seriously-injured patients are under special study in the Trauma Research Center at the University of Texas Southwestern Medical School, Parkland Memorial Hospital. Principal investigator of the Trauma Research Center is G. Tom Shires, M.D. The National Institutes of Health, through the National Institute of General Medical Sciences, is administering the Trauma Research Center grants. NIH is an agency of the U. S. Department of Health, Education, and Welfare. (NIH Photo # 930)



DALLAS, TX--Principal investigator of the Trauma Research Center at the University of Texas Southwestern Medical School is G. Tom Shires, M.D. (above). Dr. Shires and his team of investigators are measuring the metabolic, renal, hemodynamic, and cellular response to injury. Administration of Trauma Research Center grants is by the National Institute of General Medical Sciences of the National Institutes of Health. NIH is an agency of the U. S. Department of Health, Education, and Welfare. (NIH Photo # 931)

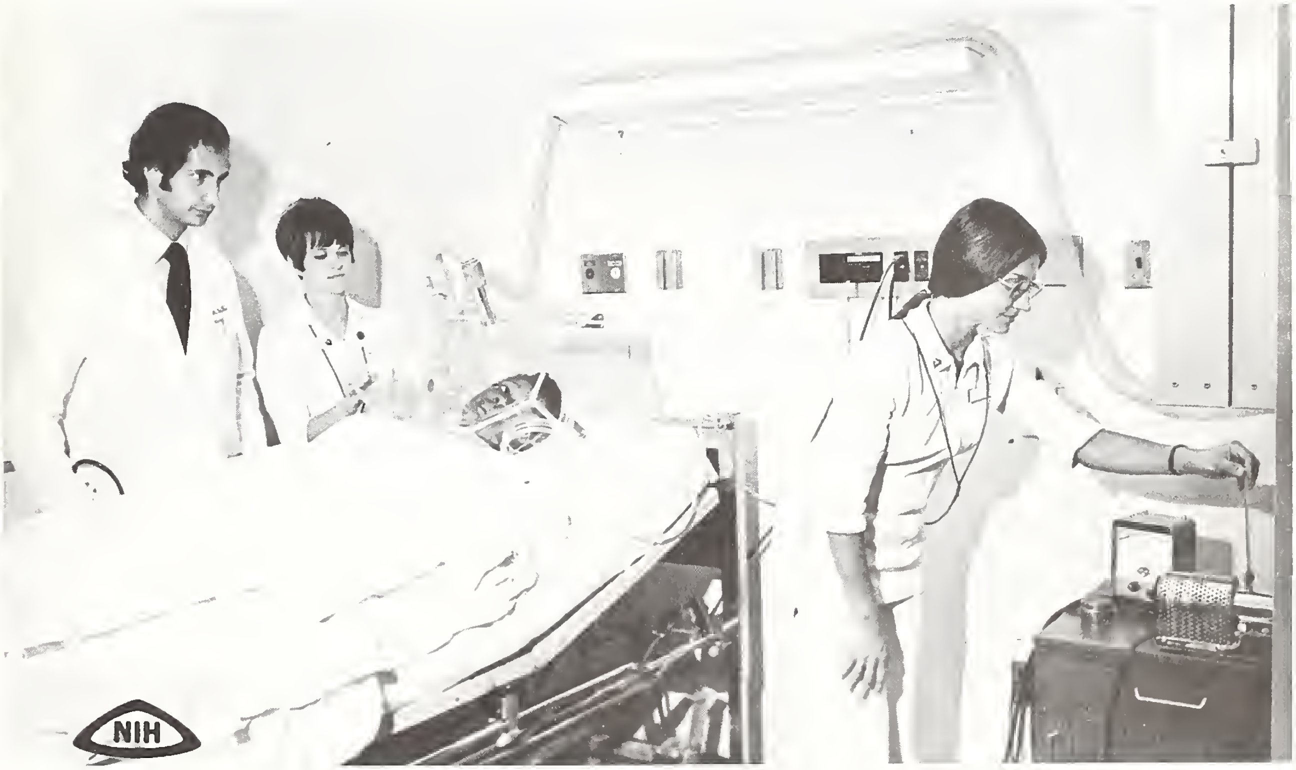
Background Statement: Research Centers within the Intensive Care Units

The trauma center program initiated in 1966, by the NIH National Institute of General Medical Sciences, combines facilities for the study of trauma patients with supporting laboratories, research equipment, and personnel. This is an attempt to bring many of the advantages of medical research to the bedside care of critically ill patients. High quality scientific studies cannot be conducted without an appropriate environment including proper equipment and reliable data collection.

Much of the recent progress in trauma research can be traced to the development of highly-sophisticated physiological monitoring systems within the intensive care units. These units have provided a better understanding of the patient's response to injury, and this effect has carried far beyond the physical limits of the units. Besides the multidisciplinary research team effort, young physicians rotating through these units are better trained in the management of the critically ill.

The experience from these trauma research units emphasize that physiologic and biochemical problems encountered in an injured person can be pursued with laboratory models of a given type at the organ, cellular, or subcellular level. The stimulus of new findings in the laboratory prompts a constant reexamination of the current methods of clinical care.

It is of interest that the experience in some of these units has demonstrated that the presence of non-clinical personnel, such as basic medical scientists of engineers in a clinical environment, often provides an atmosphere with even greater sense of concern for the patient's welfare, as well as the desire to understand the mechanisms of the disorder.



BUFFALO, NY--Reviewing investigations into fat emboli are (upper photo, from left) Drs. Worthington G. Schenk, Jr., Erich Moritz, and John R. Border at the Trauma Research Center of E. J. Meyer Memorial Hospital. Dr. Schenk is principal investigator and chairman of surgery. In lower photo, Dr. Border (right) reviews some X-rays of postoperative fractures with Dr. John Rubenstein (left) and Dr. Richard Williams (center) at a trauma research conference. The National Institutes of Health, through the National Institute of General Medical Sciences, is administering the Trauma Research Center grants. NIH is an agency of the U. S. Department of Health, Education, and Welfare. (NIH Photo #932 and #933)

Investigators at the NIGMS Trauma Research Center at the E. J. Meyer Memorial Hospital, Buffalo, have been investigating the major chain of events leading to sequential organ failures, which follow severe trauma. Round-the-clock studies involving pulmonary, hepatic, and cardiac changes are performed to permit the earliest possible diagnosis and treatment. For example, the team has developed accurate probes to identify, in man, changes in blood flow to these tissues. They want to establish a correlation of these measuring techniques with other methods such as indicator clearance and impedance plethysmography (measurement of changes in electrical resistance across an organ).

The scientists have been successful in inserting a catheter into the pulmonary artery safely and maintaining it in position for several days, thereby providing important information about the impending development of heart or lung failure following trauma.

They are also making a critical evaluation of a commonly-used dye dilution technique for measuring cardiac output. If the implication that errors of 40 to 60 percent occur in patients with severe trauma is confirmed, this finding will have significant impact on laboratory investigations and clinical care. (This is an outstanding example of the value of being able to take a laboratory test to the bedside, compare it with other measurements, and then return to laboratory studies for further exploration.)

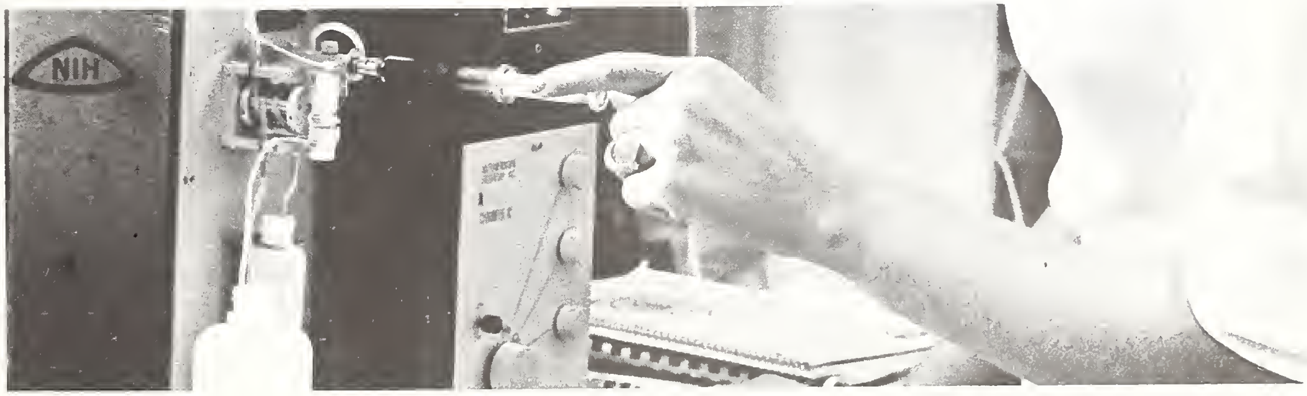
The investigators are evaluating glucagon, a hormone which appears to be able to improve blood flow to abdominal organs without increasing cardiac output. If this action occurs in patients, it should be an important step in understanding such complications as "stress ulcer" of the stomach, an often-fatal consequence of trauma.

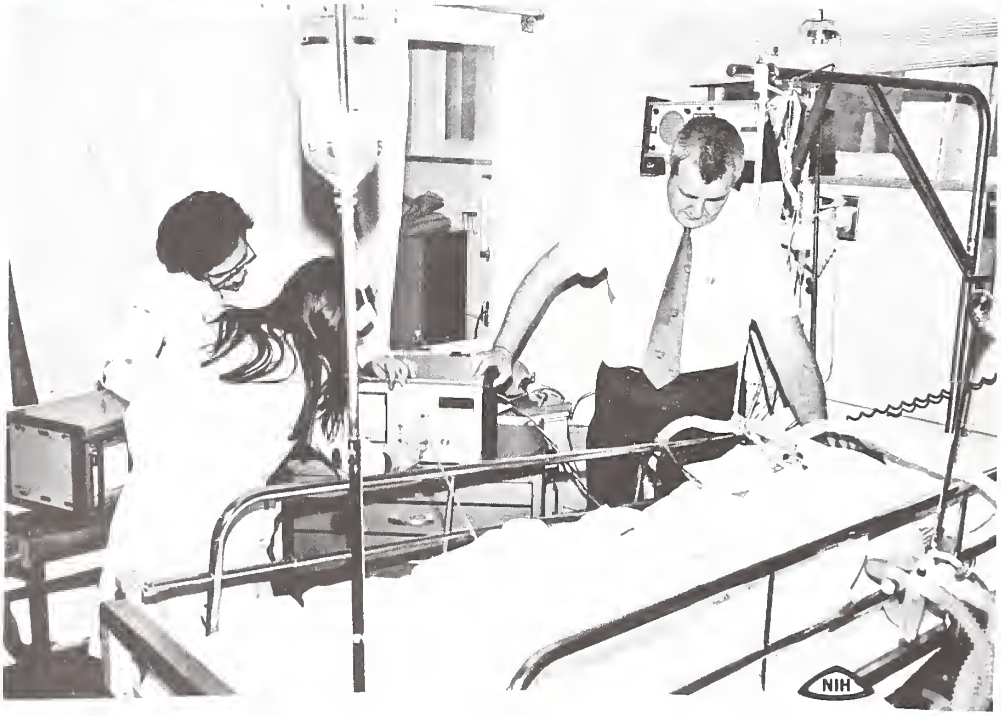
The researchers have found that licensed practical nurses, with supplemental training, are able to provide excellent clinical care to critically-injured patients and also obtain samples and measurements effectively. Teaching at all levels will remain an important facet of this trauma program.

Over the years the Trauma Research Center has had as its goal to provide a better understanding of major organ and metabolic failures, to diagnose and predict impending failure as soon as possible, and to vigorously treat the patient in order to reduce death and disability.

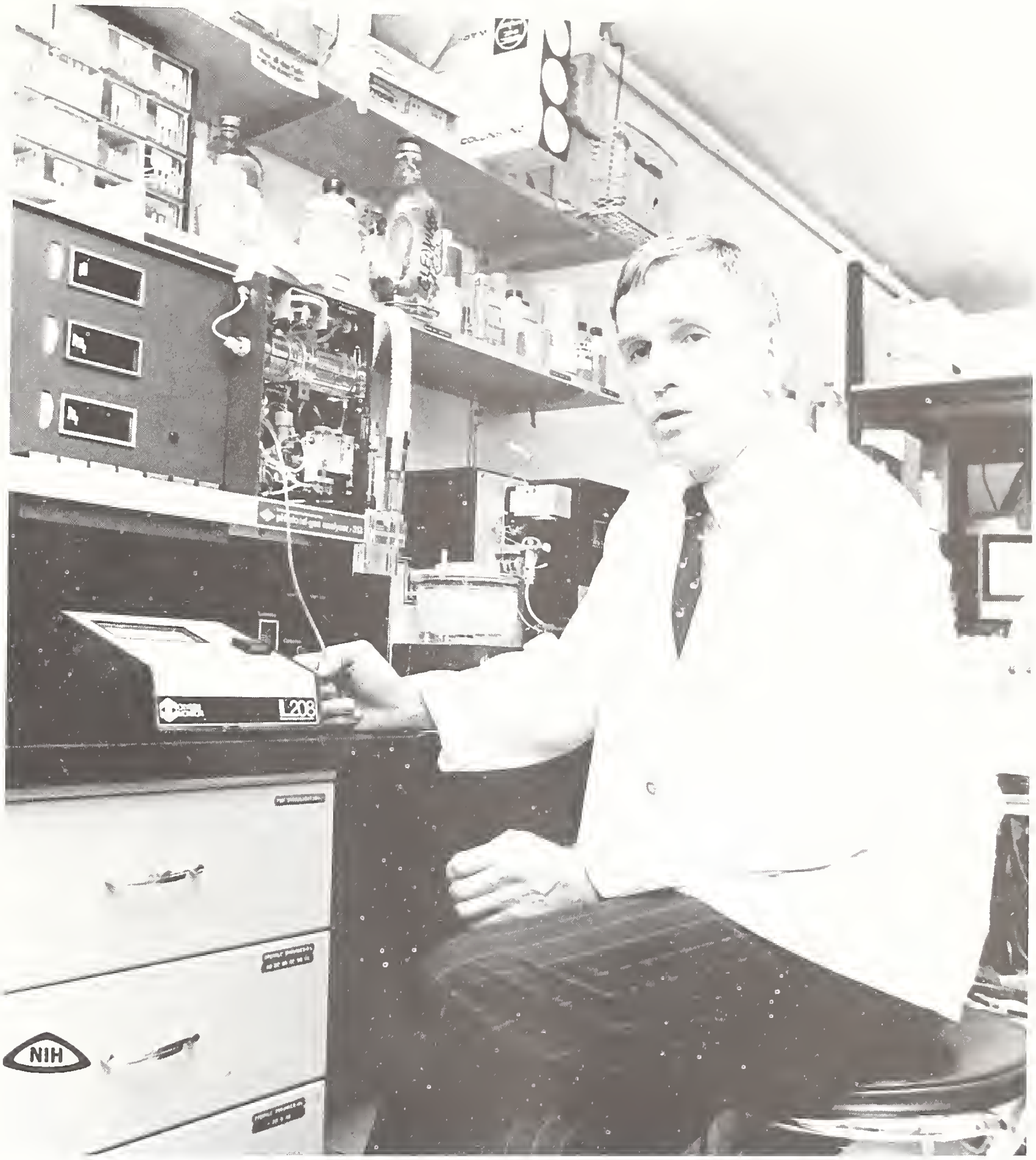
The principal investigator is G. Worthington Schenk, M.D.

Grant support of the Trauma Research Centers is administered by the National Institute of General Medical Sciences of the National Institutes of Health. NIH is an agency of the U. S. Department of Health, Education, and Welfare.





BUFFALO, NY--After reviewing (upper photo) pre- and post-operative X-rays of leg fracture at the Trauma Research Center of E. J. Meyer Memorial Hospital, Dr. John R. Border visits a patient (lower photo) to check data on changes in organ size and blood flow fed by cardiothoracic impedance plethysmography. Technicians are Pascquale Bochiechis and Jacquie Miller. Administration of Trauma Research Center grants is by the National Institute of General Medical Sciences of the National Institutes of Health. NIH is an agency of the U. S. Department of Health, Education, and Welfare. (NIH Photo # 934 and #935)



BOSTON, MA--Dr. Richard H. Egdahl, surgeon-in-chief at University Hospital, demonstrates a machine which measures blood gases and other physiological variables in the Trauma Research Center. The data is used to study critically ill patients on a very sequential basis so that decisions can be made about their care. Dr. Egdahl is the principal investigator of the Trauma Research Center at Boston University Medical Center. He hopes that the mixture of engineers, doctors, residents, research fellows, and students in patient care and research will significantly compress the prototype development time for instruments applied clinically in trauma care and research. The National Institutes of Health, through the National Institute of General Medical Sciences, is administering the Trauma Research Center grants. NIH is an agency of the U. S. Department of Health, Education, and Welfare. (NIH Photo # 936)

Hyperglycemia is a common entity of the shock syndrome. Patients admitted to the hospital with severe burns or in hemorrhagic shock are routinely given insulin and glucose despite the fact that relatively few data are available to suggest exactly how this should be done. Scientists in the NIGMS Trauma Research Center at the Bosto University Medical Complex have devised a method for *directly* measuring insulin secretion in man. The technique is based on placing catheters in two veins, which permit measurement of blood flow and insulin concentration. Using a continuous infusion of a non-toxic dye, it is possible to accurately measure portal blood flow; and this, multiplied by the portal insulin concentration, provide the means for determining insulin secretory rate.

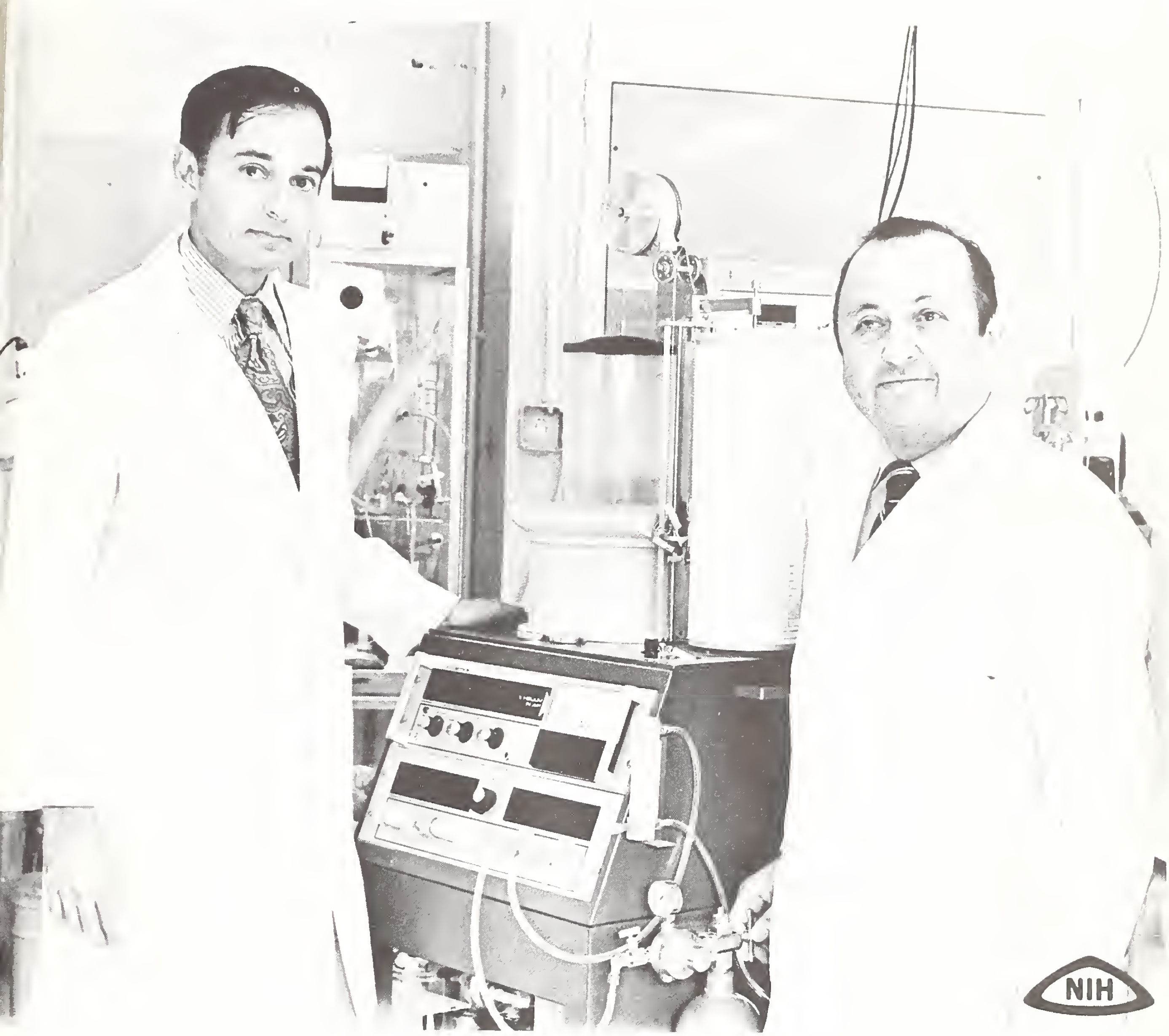
Currently this method is used to measure effects of adrenaline, corticosteroids, and other critical hormones on insulin secretion during hemorrhagic shock. The investigators conclude that hyperglycemia results from adrenaline release, which inhibits insulin release from the pancreas.

Another conclusion is that adrenaline inhibits glucose assimilation in shock, irrespective of the effects of corticosteroids. Findings suggest that the use of adrenergic blocking agents might be a rational approach to increasing glucose assimilation. Measurements of the peripheral blood of patients revealed sustained increasing cortisol concentration, inhibited insulin secretion, and abnormal glucose assimilation proportional to the degree of traumatic insult. Continued research in this area should provide information from which vital decisions regarding treatment can be made.

In the respiratory studies being done by these investigators, two new methods of measuring cardiac output have been devised. First is the thermodilution technique which is integrated with a computer and calculation is made in five to ten minutes. The second is by ultrasound and is non-invasive. Using a Doppler probe, the velocity of the blood is measured and a continuous recording of stroke volume is made.

The principal investigator is Richard H. Egdahl, M. D.

Research funds used for the Trauma Research Centers are administered by the National Institute of General Medical Sciences, a component of the National Institutes of Health. NIH is an agency of the U. S. Department of Health, Education, and Welfare.



BOSTON, MA--In the Trauma Research Center at Boston University Medical Center, Dr. Herbert B. Hechtman, (left) assistant professor of surgery, and Dr. Alexander M. Rutenburg, professor of surgery, examine a sophisticated machine they use to measure the functional lung capacity of critically ill trauma patients. Dr. Hechtman is researching pulmonary physiology problems of patients' respiratory systems. Administration of Trauma Research Center grants is by the National Institute of General Medical Sciences of the National Institutes of Health. NIH is an agency of the U.S. Department of Health, Education, and Welfare. (NIH Photo # 937)

Studies at the NIGMS Trauma Research Center at the University of Mississippi Medica Center, Jackson, have focused on energy metabolism in burn patients. Through the u of indirect calorimetry, they hope to provide standard measurements which can serve as guidelines for adequate nutritional therapy. Measurements are being made of O_2 consumed, CO_2 expired, total calories expended, and types of foodstuffs being burne

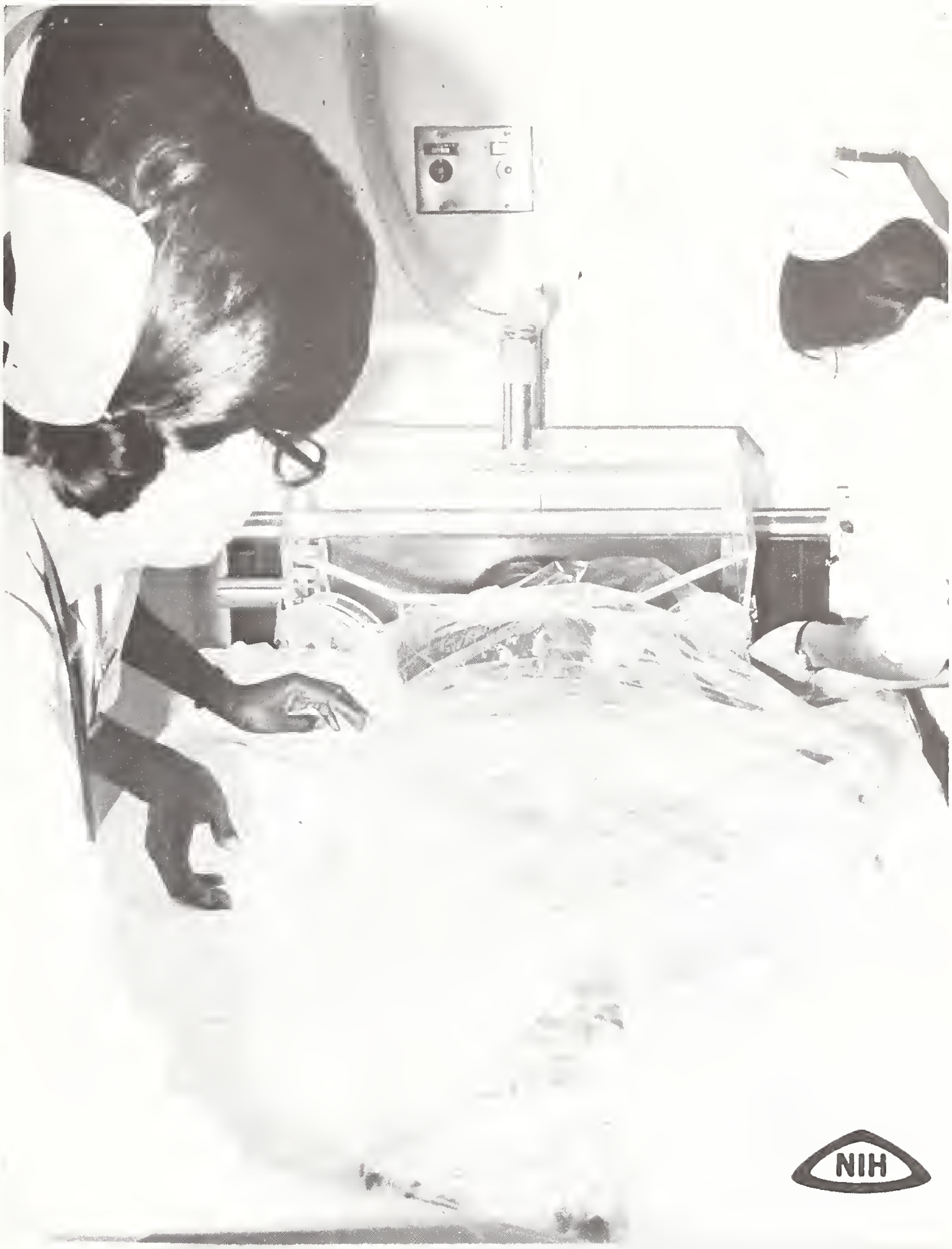
It has been found by this group that plastic wrappings on the burn areas substantially reduce the wet heat loss and thus reduces the caloric expenditure. They also noticed that sponging the body of a severely-burned patient with cool water does not reduce the fever but increases the energy expenditure because of the shivering.

Intravenous hyperalimentation is considered a necessary adjunct to successful burn therapy. However, this group is involved in ways of preventing the occurrence, following such therapy, of secondary infections which are frequently life threatenin Studies are being done on sites of infections, numbers and types of infections, as well as the effect of bacterial filters.

The principal investigator is James D. Hardy, M.D.

Award of grants for the Trauma Research Centers is made by the National Institute of General Medical Sciences of the National Institutes of Health. Within the U. S. Department of Health, Education, and Welfare, NIH is an operating agency.

JACKSON, MS--Discussing future plans for research at the Trauma Research Center are four staff members of the University of Mississippi Medical Center. They are (from left) Dr. William A. Neely, Dr. Antony Petro, Dr. James D. Hardy, and Dr. Don Turner. Dr. Hardy is principal investigator of the Trauma Research Center. In Bethesda, NIH, through the National Institute of General Medical Sciences, supports the Trauma Research Center program. (NIH Photo # 938)



.CKSON, MS--Studies on massively burned patients are under way at the University of
.ssissippi Medical Center's Trauma Research Center, to find out if wrapping the in-
ıred portion of a patient's body in plastic affects energy expenditure. The wrapping
ɔpears to reduce the body's use of stored fuels, thus cutting down on energy given
f. Means of improving and preserving the burn patient's stored reserves are important
ecause of the rapid weight loss many burn patients experience. If it can be shown
ıat covering burn wounds does reduce the rate at which the patient's nutritional
eserves are used, the incidence of late burn deaths attributed to lack of food intake
ıd accompanying infection may be lowered. Grant support of the Trauma Research
enters is administered by the National Institute of General Medical Sciences of the
ational Institutes of Health. NIH is an agency of the U.S. Department of Health,
ducation, and Welfare. (NIH Photo # 939)

Background Statement: Burn Research

During 1971, approximately two million people received burn injuries, an increase of almost twice the number reported for 1967. Of the 300,000 who received burns severe enough to cause disability, 30,000 required prolonged intensive care for an average stay of 64 days. Despite the excellence of these intensive care units, 38 percent died from either early undefined biochemical and physiological changes or from latest fulminating infection. Children under 15 experienced 29 percent of the deaths from burns, and generally, males outnumbered females.

Obviously, the management of severe burns (30 percent total body surface) is still a critical problem. Although there are effective means of handling the acute shock phase by judicious intravenous fluid replacement and other supportive measures, there has not been an appreciable decrease in the overall mortality. Rather there has been a shift in the time of death. Many of those who survive the initial crisis die from overwhelming infections or pulmonary or renal complications.

A recent concentrated effort by some medical scientists on burn research has led to the development of more specific forms of treatment with moderate success for some of these problems. However, much work is still needed to completely understand the complex pathogenesis of the burn disease syndrome. For instance, much is still to be learned about the relations of infection to host resistance, and why antibiotic therapy has been ineffective. Also, little is known as to how abnormal immunological responses affect skin grafting, the most important method of repair of burned skin.

Early suggestive evidence for the release of toxic materials after thermal injury has aroused the interest of some investigators, who recently have isolated compounds from burned animals capable of causing 100 percent mortality in healthy animals. However, much more research is needed to determine if such a toxin appears in the burned human.

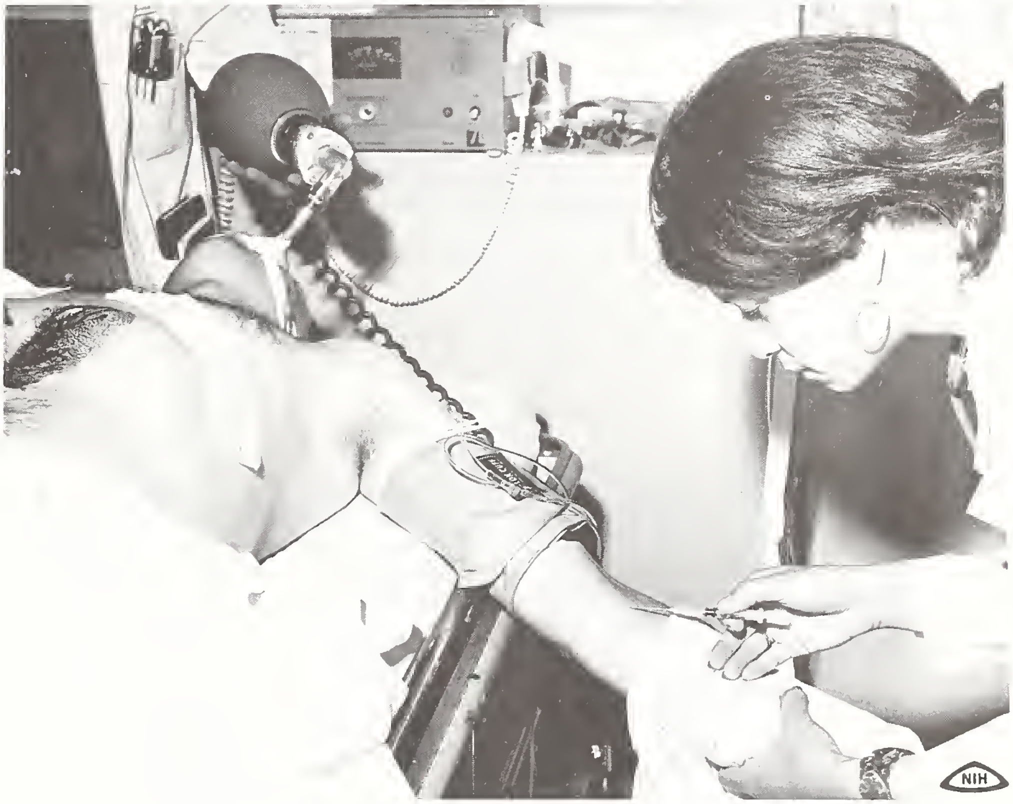
In FY 1972, the National Institute of General Medical Sciences, NIH, supported burn research in the amount of $767,810. Part of this research effort is included in the Trauma Research Centers Program, but it has been a relatively small component of the total investigations.

In the Trauma Research Center at the University of Texas Southwestern Medical School, Dallas, one of the projects in the study of the integrated response to trauma involves early resuscitation of burns. The investigators have found that complete replacement of body fluids lost from severe burns within the first 24 hours of thermal injury prevents severe metabolic acidosis and cardiac depression.

Also they have found evidence for a circulating myocardial depressant factor in burn shock. The presence of this substance appears to be directly proportional to the severity of the burn. Its exact chemical nature is still unknown, and it remains to be determined whether such a factor is unique only to burn shock. These preliminary studies suggest that the presence of such a potent factor may limit the effectiveness of fluid volume resuscitation in the initial phase of burn injury.

Other studies on burns at the NIGMS Trauma Research Centers involve energy metabolism, immune response, sepsis, the effects of sterile environment, etc.

Although not directly involved in specific burn research, baseline measurements of vit signs are being made, allowing physicians to determine impending danger in such specif disease entities as thermal injuries.



SAN FRANCISCO, CA--In the Trauma Research Center of the University of California, San Francisco, doctors and nurses are doing multidisciplinary studies on patients with severe injuries. William Blaisdell, M.D., is principal investigator of the Trauma Research Center that is funded by the National Institute of General Medical Sciences. NIGMS is a component of HEW's National Institutes of Health. (NIH Photo # 940 and #941)

SAN FRANCISCO

Scientists in the NIGMS Trauma Research Center at the University of California, San Francisco, have made advances in wound healing. A plastic tube has been developed for use in measuring tissue oxygen tension in burn and trauma patients. A conjunctival oxygen electrode is being tested in operating room patients. These instruments have made it possible to follow oxygen from inspired air to the tissue level. The researchers have documented a lack of oxygen and increased carbon dioxide in injured patients, which may be significant in wound healing.

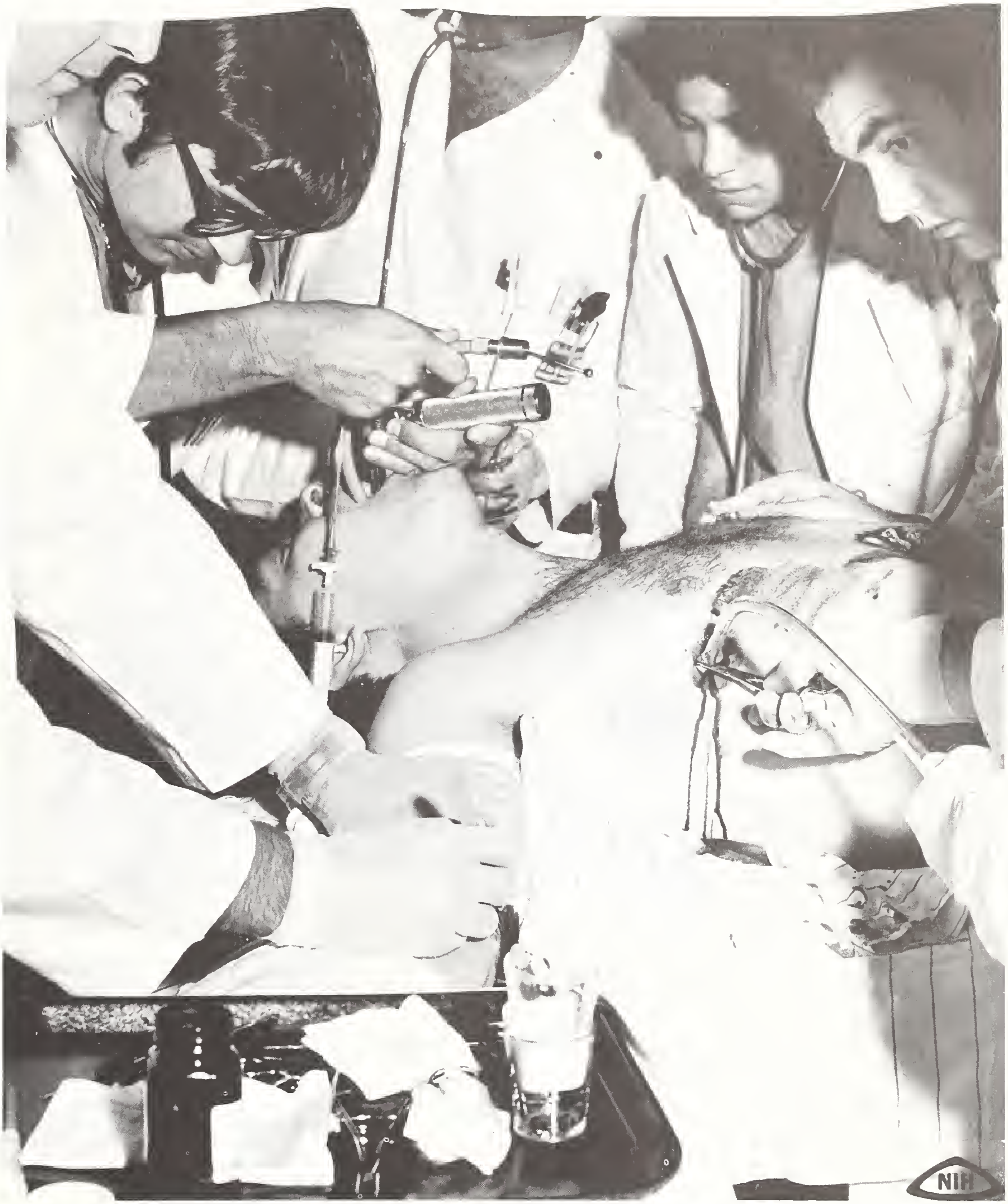
The investigators believe that post-traumatic pulmonary insufficiency following trauma is due to abnormal blood clotting mechanisms. In tests of animal models clotting problems have been minimized and PTPI prevented with heparin. Assessment of the role of platelets in abnormal clotting and bleeding of traumatized patients is being made. This group has found that actual platelet counts do not measure platelet function. Attempts are being made to obtain a specific test for determining abnormal function. It has been determined that masses of aggregated platelets fill capillaries and arterioles early in trauma, and it is believed that these aggregates cause organ failure.

In the neurosurgical project, attempts are being made to predict the survival of brain tissue following injury by measuring the blood flow on one side of the brain and comparing it to the other side. If successful, this may prove to be a more precise technique for measuring cerebral function than the current neurological devices.

It has been shown that fresh blood is needed to transfuse patients suffering from post-traumatic shock, in which there is an oxygen deficiency in the tissues. Blood stored in usual liquid preservative for over seven days will increase its capacity to hold onto oxygen, theoretically diminishing the red cells' ability to deliver oxygen to the tissues. These investigators have been successful in restoring the red blood cells' ability to unload oxygen by intravenous infusion of a simple inorganic phosphate. If further studies confirm these findings, it would permit the use of banked blood, the only blood readily available for emergencies.

The principal investigator is William Blaisdell, M. D.

Funds of the National Institute of General Medical Sciences are awarded for the operation of Trauma Research Centers. NIGMS is a component of the National Institutes of Health, an agency of the U. S. Department of Health, Education, and Welfare.



AN FRANCISCO, CA--The trauma team at the University of California, San Francisco, is roviding, through research, better methods of handling the seriously-injured. William laisdell, M.D., is principal investigator of the Trauma Research Center located at CSF. Award of grants for the Trauma Research Centers is made by the National Institute f General Medical Sciences of the National Institutes of Health. Within the U. S. epartment of Health, Education, and Welfare, NIH is an operating agency. (NIH hoto # 942)

NEWS&FEATURES FROM NIH

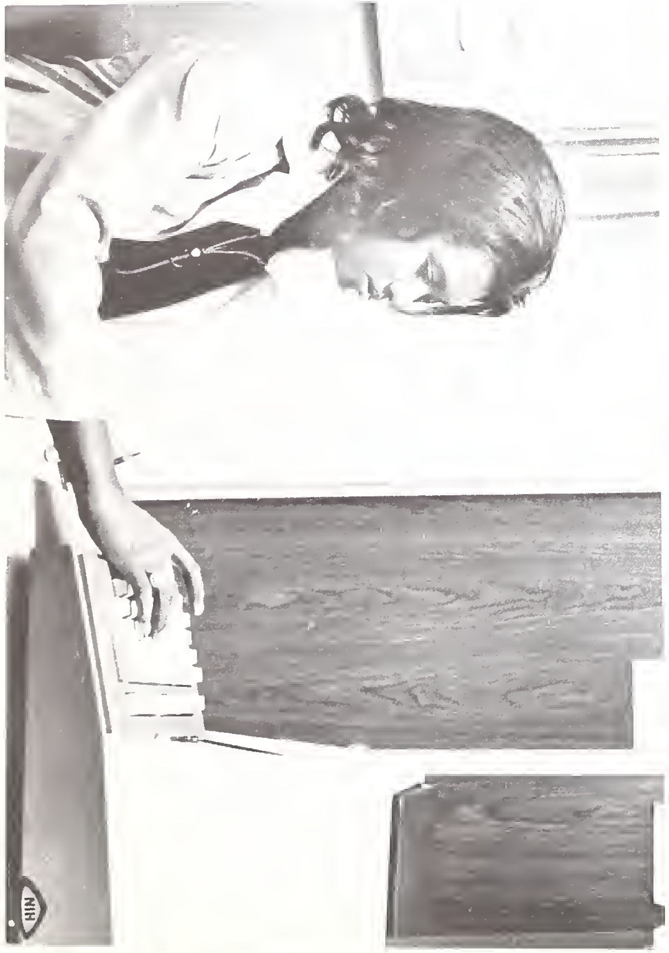
OCTOBER 1972

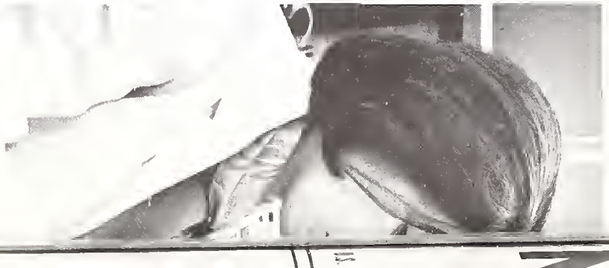
This PORTFOLIO Was Prepared
With the Cooperation of the
Eight Local Press Contacts.

PORTFOLIO SERIES · 3 · TRAUMA RESEARCH

It Includes an Introduction
and Three Background State-
ments, plus 45 photographs.

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE■Public Health Service■National Institutes of Health■Office of Information■Bethesda, Maryland 20014





NEWS&FEATURES FROM NIH

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE ■ Public Health Service ■ National Institutes of Health ■ Office of Information ■ Bethesda, Maryland 20014

October 25, 1972

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SPECIAL ANNOUNCEMENT:
NIH Scientist Wins Nobel Prize

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Special Announcement

Chemistry Award...

NIAMDD SCIENTIST WINS NOBEL PRIZE

Christian B. Anfinsen, Ph.D., has been awarded the Nobel Prize in chemistry for his work with the enzyme ribonuclease.

Dr. Anfinsen, Chief of the Laboratory of Chemical Biology at the NIH National Institute of Arthritis, Metabolism, and Digestive Diseases, formulates and administers a program of research on the structure, function, and biosynthesis of proteins. He is primarily responsible for the generally accepted theory that the tertiary structures of proteins are determined by their amino acid sequences.

Dr. Anfinsen has been associated with NIH for more than 20 years, coming here in 1950 to become Chief of the Laboratory of Cellular Physiology and Metabolism in the National Heart Institute.

Dr. Christian B. Anfinsen and his wife Florence receive word that he has been awarded the Nobel Prize in chemistry. Dr. Anfinsen is a biochemist with the NIH National Institute of Arthritis, Metabolism, and Digestive Diseases.

(more)

Nobel Prize (Cont'd)

The biochemist will share the chemistry prize for his work with the other two winners, Drs. Stanford Moore and William H. Stein. Dr. Stein, a grantee of the National Institute of General Medical Sciences, and Dr. Moore, a National Institute of Neurological Diseases and Stroke grantee, are both at the Rockefeller University, New York City.

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NOTE TO SCIENCE WRITERS:

More details and more photographs in the next issue of NEWS & FEATURES From NIH.

NEWS & FEATURES From NIH October 25, 1972

Research Advances

DIETARY ZINC AND COPPER MAY CONTROL BLOOD FATS

A diet which is low in essential metals may make a person more vulnerable to heart attack. And conversely, manipulation of certain metals in a person's diet may offer a way to control dangerous levels of blood fats.

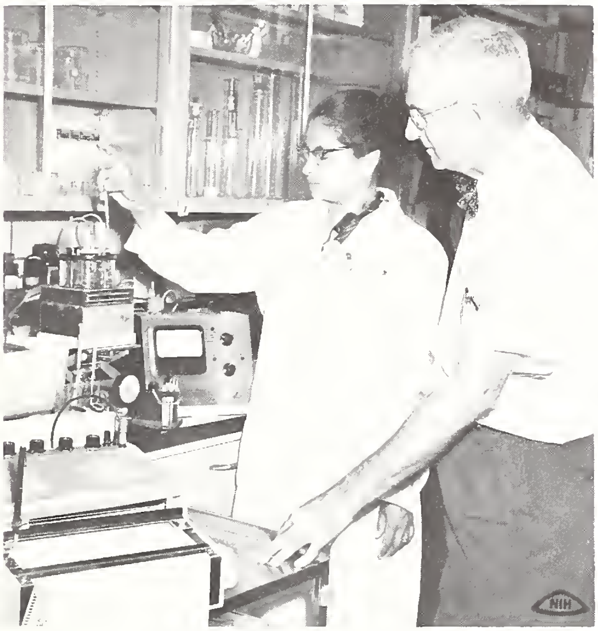
This speculation is based on research by Dr. Harold G. Petering, Dr. Lalitha Murthy and Dr. Ellen J. O'Flaherty at the University of Cincinnati Medical Center department of environmental health. Dr. Petering and associates found--apparently for the first time--a relationship between serum lipid levels (blood fats) and the nutritional intake of zinc and copper, as well as the serum levels of these metals.

Funds for the study came from the University's Center for the Study of Human Environment which is supported by a grant from the National Institute of Environmental Health Sciences.

Dr. Harold G. Petering, professor of environmental health at the University of Cincinnati Medical Center, studied the complex interaction of both zinc and copper on lipid metabolism in male rats. (NIH Photo #943)

(more)

The investigators studied the complex interaction of both zinc and copper on lipid metabolism in male rats fed a diet deficient in both zinc and copper and housed in an environmentally-controlled room. Zinc and copper were alternately added to the animals' drinking water to determine the effect of the essential metals on lipid metabolism.



Dr. Petering and Dr. Lalitha Murthy, use a recording oxygen electrode to determine the respiratory activity of liver slices obtained from rats fed metal-deficient diets. (NIH Photo #944)

Although these studies are limited at the present time to laboratory rats, the investigators believe that the significance for man is inescapable. Since serum lipid levels have been related to atherosclerosis and coronary heart disease in man and since researchers are working to develop ways of reducing serum levels of lipids, this finding that dietary levels of the metals can markedly affect serum lipid levels should add a new dimension to both the experimental and clinical studies of the role of lipids in human cardiovascular disease.

"Perhaps man is particularly vulnerable to increases in cholesterol," Dr. Petering explains "because he has enough zinc and copper in his body to get good growth, but not enough to forestall high and potentially dangerous levels of blood fat." He believes that other researchers studying fat metabolism in experimental animals, and clinicians trying to control blood fat levels of their patients must consider zinc and copper metabolism.

(more)

In the present study, Dr. Petering investigated cholesterol, triglycerides and phospholipids, which account for 99 percent of the lipids in the blood. He found that when the body content of zinc and copper is raised, the blood fat levels decreases. (This is more obvious for copper than for zinc.) When the amount of metals in the diet is lowered, on the other hand, fat levels rise. (People get their dietary zinc through some types of milk and their copper from egg yolk. Meat is a source for both metals.)

According to Dr. Petering, "These findings might unravel some problems of environmental health. If man is subjected to certain environmental conditions--such as exposure to a chemical which depresses zinc and copper--he might also get elevated levels of lipids."

In earlier studies, the Cincinnati scientist determined that exposure of rats to lead or cadmium does depress copper and zinc metabolism. It is possible that exposure of man to these metals as well as to chemicals may depress copper and zinc metabolism and thus alter normal lipid metabolism. The researchers plan to continue to study whether or not chemicals which affect zinc and copper metabolism will also affect lipids in the body.

In addition to the Cincinnati research team, other investigators are studying fats, because blood fats along with the presence of high blood pressure have been implicated in atherosclerosis--the forerunner of stroke--and in coronary disease. Unless these studies include control of dietary zinc and copper, Dr. Petering believes, the findings could be misleading.

(more)

He explains that experiments with research animals being fed a commercially-produced "protective" diet rich in zinc and copper will not be identical with man's dietary conditions--which is not always rich in those metals. Such blood fat findings, therefore, cannot readily be applied to man.

Dr. Petering, professor of environmental health and Drs. Murthy and O'Flaherty, senior research associates in environmental health, reported their findings at the ninth International Congress of Nutrition in September.

#

NOTE TO SCIENCE WRITERS:

For background material on Dr. Petering's work with the essential metals zinc and copper, see *News from NIH*, October 15, 1971, "Hair Levels of Zinc and Copper Reflect Changes in Nutritional Intake."

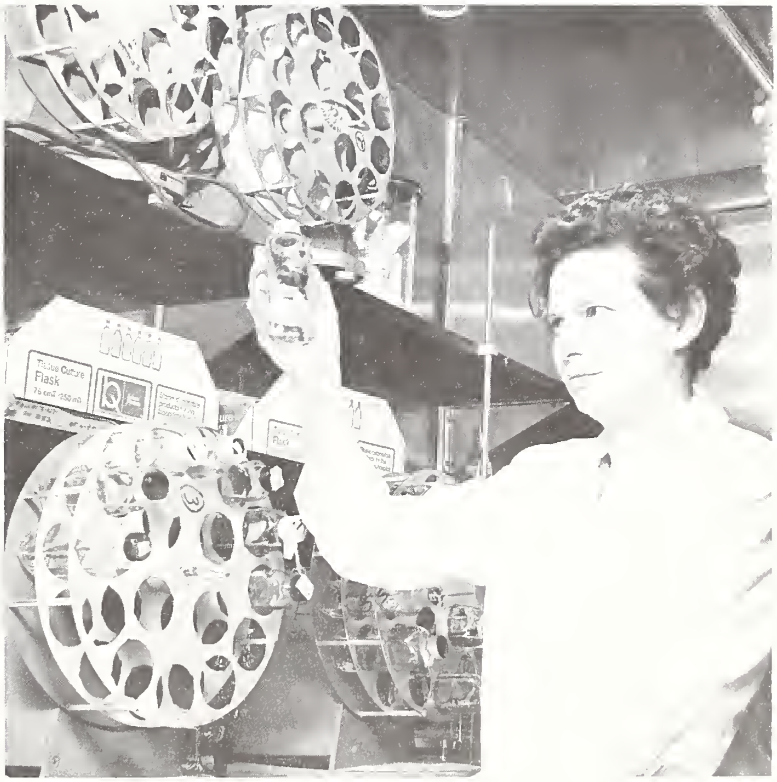
Research Advances

NIH BIOCHEMISTS PINPOINT DEFECT IN HURLER'S SYNDROME

An NIH-based research team has identified the biochemical defect in Hurler's syndrome, an inherited metabolic disorder marked by skeletal deformities, mental retardation, and early death. According to Dr. Elizabeth F. Neufeld and associates, the far-reaching implications of this finding include the possibility that early correction of the flaw might correct, if not prevent, the disorder's bizarre clinical manifestations.

Dr. Neufeld, a biochemist at the National Institute of Arthritis, Metabolism, and Digestive Diseases (NIAMDD), explained that the Hurler syndrome ("gargoylism") is the most striking and best known of the inborn errors of mucopoly-

(more)

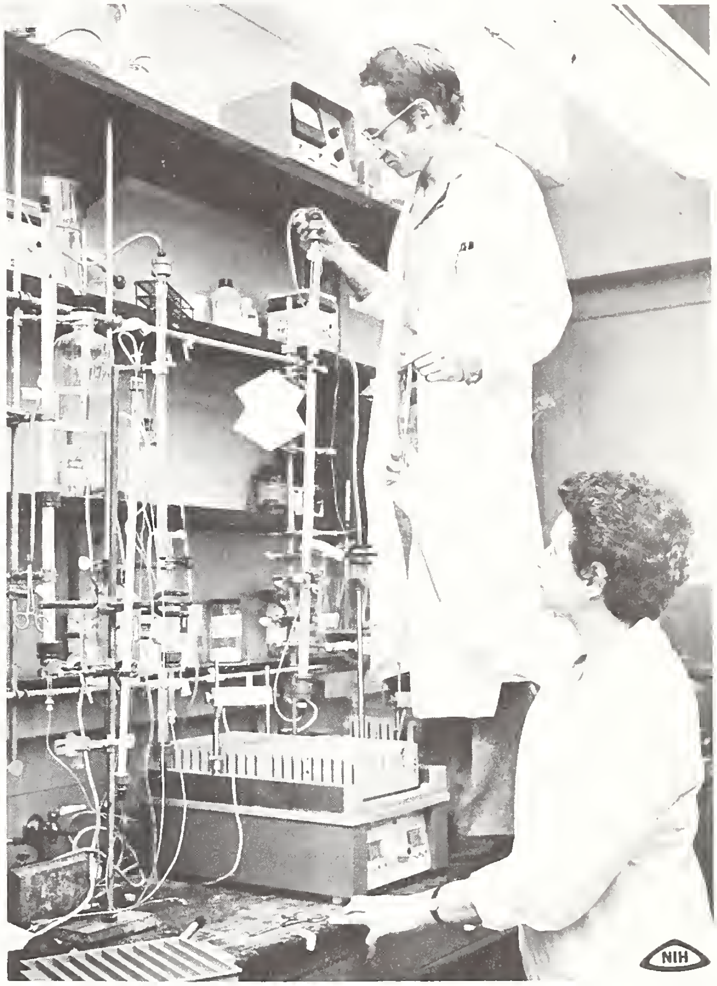


Cells taken from the skin of patients having either Scheie's or Hurler's syndrome are grown in an incubator room. Dr. Elizabeth F. Neufeld of the National Institute of Arthritis, Metabolism, and Digestive Diseases checks on the rate of growth of the fibroblasts. (NIH Photo #945)

saccharide metabolism. The severe clinical manifestations of the disease include skeletal deformities, inflammation of the liver and spleen, clouded corneas, stunted physical and mental growth, and cardiovascular abnormalities.

Working with Dr. Neufeld on this research project were Dr. Gideon Bach, also of NIAMDD, Dr. Bernard Weissmann, and Robert Friedman (Dr. Weissmann's student) both of the University of Illinois. Their research was supported in part by a grant from NIAMDD.

In earlier studies, the same scientists demonstrated that patients with Hurler's syndrome lack a protein which is found in normal blood plasma and certain cellular extracts. They originally termed this "Hurler corrective factor." In test tube studies, the researchers found that they could correct the basic biochemical flaw by replacing the missing protein in cells cultured from affected individuals. Hence the name, "Hurler corrective factor."



Two NIAMDD scientists, Dr. Elizabeth F. Neufeld and Dr. Gideon Bach prepare a sephadex column for gel chromatography. They will separate complex macromolecules into their components: proteins and polysaccharides. (NIH Photo #946)

(more)

In the present study, Dr. Neufeld and associates found that cells cultured from patients with either Hurler's or Scheie's syndrome--a closely related disorder--have a deficiency of the enzyme, a-L-iduronidase. This deficiency corresponds precisely with their deficiency of "Hurler corrective factor." Therefore, Dr. Neufeld concludes that the Hurler and Scheie syndromes now may be classified as a-L-iduronidase deficiency diseases.

In both the Hurler and Scheie syndromes the metabolism of mucopolysaccharides--substances belonging to the carbohydrate family--is deranged. This derangement leads to an accumulation of certain of these chemicals in various parts of the body and results in the characteristic clinical manifestations of both syndromes. The enzyme, a-L-iduronidase, is essential to the normal metabolism of mucopolysaccharides.

While patients with Hurler's or Scheie's syndrome have a cellular deficiency of a-L-iduronidase, normal healthy individuals have a cellular excess of this important enzyme. The investigators discovered, however, that only a fraction of the normal cellular level of the enzyme is required to correct excessive intracellular accumulation of mucopolysaccharide. Therefore, they believe that future attempts at either activating or replacing the missing enzyme in affected persons might be beneficial even if they achieve only low enzymatic levels.

This finding might also explain why infusion of normal human plasma, which has very little "Hurler corrective factor" or a-L-iduronidase activity, has been found to result in significant clinical and biochemical improvement in patients with Hurler's syndrome.

The researchers published a complete report of their findings in the *Proceedings of the National Academy of Sciences*, August 1972.

#

Research Advances

May Lead To Improved Fertility Control...

GRANTEE SUCCESSFULLY ANALYZES THE COMPLEX HORMONE HCG

Dr. Om Bahl, an NIH grantee in Buffalo, has successfully isolated human chorionic gonadotropin (HCG), a hormone from human pregnancy urine. This represents the first time the complex structure of such a hormone has been completely understood.

This research, at the State University of New York, was supported by five years of grant support from the National Institute of Arthritis, Metabolism, and Digestive Diseases. Dr. Bahl's work may have an important application in the development of a better means of fertility control and the improvement of those methods now available.

According to India-born Dr. Bahl, "not only can we now separate the two subunits of this molecule (its 231 amino acids and 55 sugars) but we can recombine them in the laboratory as well."

Unraveling the various metabolic steps leading to an understanding of the hormone's complete mechanism of action represents the next phase of research. According to Dr. Bahl, "once we fully understand how this hormone works, we will develop a means of suppressing ovulation and thus preventing pregnancy."

Produced by the placenta during pregnancy, HCG is responsible for the maintenance of pregnancy and early growth of the embryo. While production levels of this hormone rise during pregnancy, they are even greater in certain types of cancer of the uterus. Malfunction of this hormone may be responsible for certain diseases as well.

(more)

In order to analyze such a complex molecule, plans of specific enzymes were first isolated and characterized in the lab, and specific chemical compounds were synthesized. This was followed by successful application of enzymes to structure and determination of the complex structure of protein.

#

Photo Feature

CHINESE PHYSICIANS VISIT NIH RESERVATION, DISCUSS CANCER AND HEART RESEARCH

A delegation from the People's Republic of China visited the National Institutes of Health on October 13 and 14.

The visitors, including ten leading physicians, were invited to the United States by the National Academy of Sciences' Institute of Medicine and the American Medical Association.

Dr. Robert Q. Marston, NIH Director, greeted the delegation in front of NIH Building One. He welcomed them to the Bethesda campus and escorted them into a conference room for a brief orientation session. A portion of the NIH film, "To Seek, To Teach, To Heal," was shown and a complete print was presented to Dr. Wu Wei-jan, leader of the Chinese delegation.

The visitors then toured the NIH reservation and entered the National Library of Medicine for a discussion by NLM Director, Dr. Martin M. Cummings.

Later the delegation visited the NIH Clinical Center and heard details about cancer research and therapy. The Chinese doctors, several of whom spoke excellent English, asked National Cancer Institute scientists about certain aspects of cancer chemotherapy and other treatment.

Among those representing NCI were Clinical Director Dr. Alfred S. Ketcham, and Drs. C. Gordon Zubrod, Paul P. Carbone, Vincent T. DeVita, Jr., Edward S. Henderson, and Arthur S. Levine.

(more)

Clinical Center Director Dr. Thomas C. Chalmers described the work of the large NIH hospital that is noted for its outstanding patient care and research.

During another important session, the Chinese doctors participated in a National Heart and Lung Institute (NHLI) symposium on coronary artery disease. Heart disease is a growing problem in China.

Included among those representing NHLI were Director Dr. Theodore Cooper, and Drs. Robert L. Ringler, Donald S. Fredrickson, Stephen E. Epstein, and Jerome G. Green.

The Chinese delegation arrived in the U.S. on October 12 for a three-week visit to six cities. They met President Nixon at the White House immediately before the NHLI symposium.

Arrangements for the NIH visit were made by the Fogarty International Center.

(more)

Television crews recorded NIH Director Dr. Robert Q. Marston's greetings to Dr. Wu Wei-jan (left, first row), leader of the delegation from the People's Republic of China. (NIH Photo #947)

(more)

Chinese Visitors (Cont'd)

NIH scientists told the visiting Chinese doctors about patient care and research under way in the NIH Clinical Center. The Clinical Director of the National Cancer Institute, Alfred S. Ketcham, M.D., is shown at right in top two photos. (NIH Photos #948, #949, #950, #951 clockwise from top left)

(more)

Chinese Visitors (Cont'd)

The Chinese delegation viewed a model (upper photo) of the 300-acre NIH campus in Bethesda. They then visited the National Library of Medicine where NLM Director Dr. Martin M. Cummings was their guide. (NIH Photos #952 and #953)

#

NEWS & FEATURES From NIH October 25, 1972

News-Feature

NIGMS AWARDS FIRST MINORITY GROUP FELLOWSHIP TO SICKLE CELL RESEARCHER

Dr. Peggy J.B. Scurry has an intense interest in the health problems of black people. She describes her career goal as "simply to direct a meaningful and relevant research program in sickle cell disease at the college level and also to help develop a clinical method which will relieve the suffering of sickle cell victims."

Recently awarded a minority group special fellowship from the National Institute of General Medical Sciences, Dr. Scurry now can pursue her goal further.

An associate professor of chemistry at Bowie State College in Maryland, Dr. Scurry, 28, has already trained students as well as organized, developed, and obtained the necessary supplies and equipment for a sickle cell anemia clinic at the school. With her fellowship funds to defray living expenses and costs for tuition and supplies, Dr. Scurry now will conduct research at the Center for Sickle Cell Anemia at the Howard University Medical Center, Washington, D.C.

Presently, sickle cell anemia remains incurable and treatment, while affording some relief, is often inadequate. Therefore, Dr. Scurry believes there are "compelling reasons to focus attention on the immediate health needs of sickle cell victims." According to her, "The mortality rate is excessive and many victims, including the young, are plagued by strokes, enlarged hearts, gallstones, pain in the joints, and many other health problems."

(more)

Specifically, Dr. Scurry's research project will be aimed at elucidating the chemical mechanisms in the body responsible for the formation of abnormal hemoglobin. This abnormal hemoglobin causes red blood cells to form crescent or sickle shapes. Arterioles and capillaries become painfully clogged by these cells and anemia results from red cell destruction.

A fuller understanding of the mechanisms for abnormal hemoglobin formation will lead to better therapeutic methods for reducing the sickling process, she believes.

One of a group of 12 candidates, Dr. Scurry is the first to qualify for fellowship support under the NIGMS new Minority Access to Research Careers (MARC) Program. The program was founded to further the teaching and research roles of biomedical educators serving universities and colleges with enrollments consisting largely of blacks and other racial and ethnic minority students. A minimum half-million dollars is allocated for these purposes by the Institute for the fiscal year ending next June 30.

Following completion of her studies, Dr. Scurry expects to return to Bowie State to further motivate and better prepare more students for careers in health science and medicine.

#

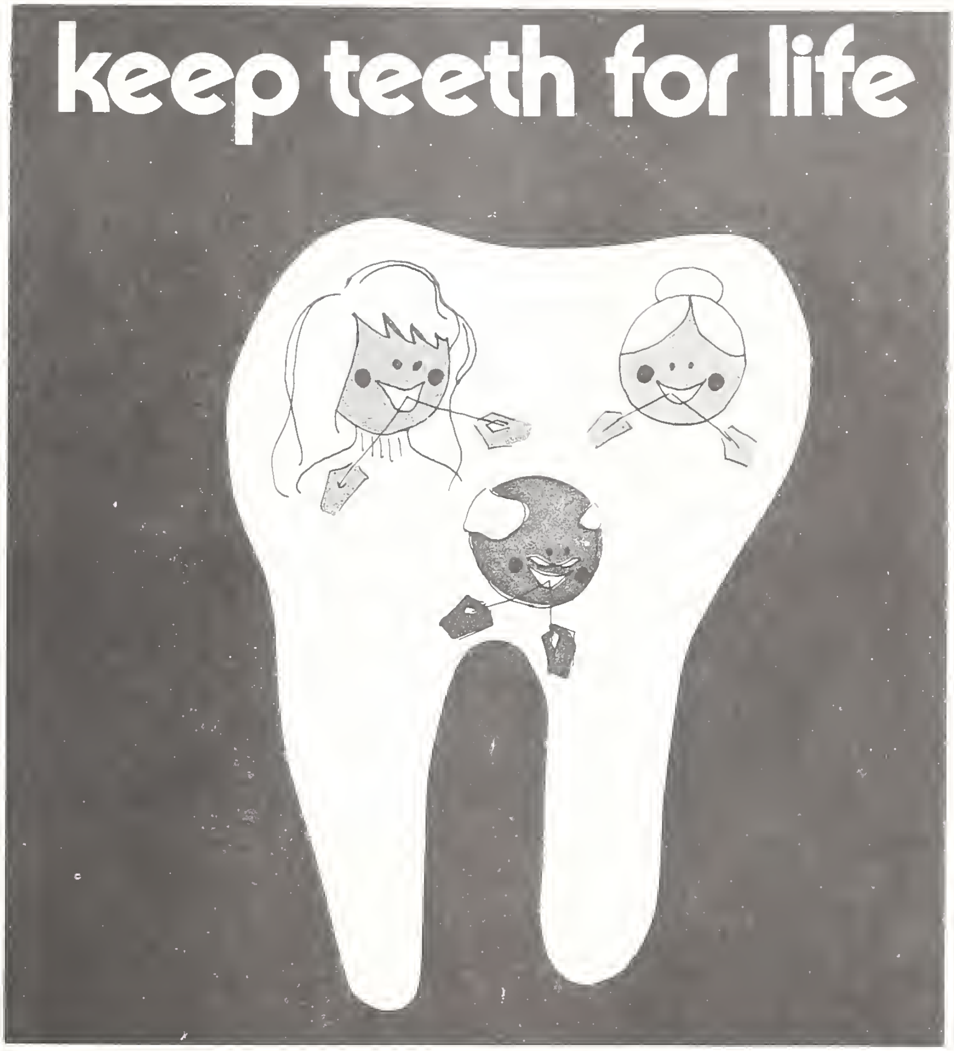
This article was prepared for NEWS & FEATURES From NIH *by the National Institute of General Medical Sciences Information Office.*

NEWS & FEATURES From NIH October 25, 1972

Photo Feature

Use Dental Floss...

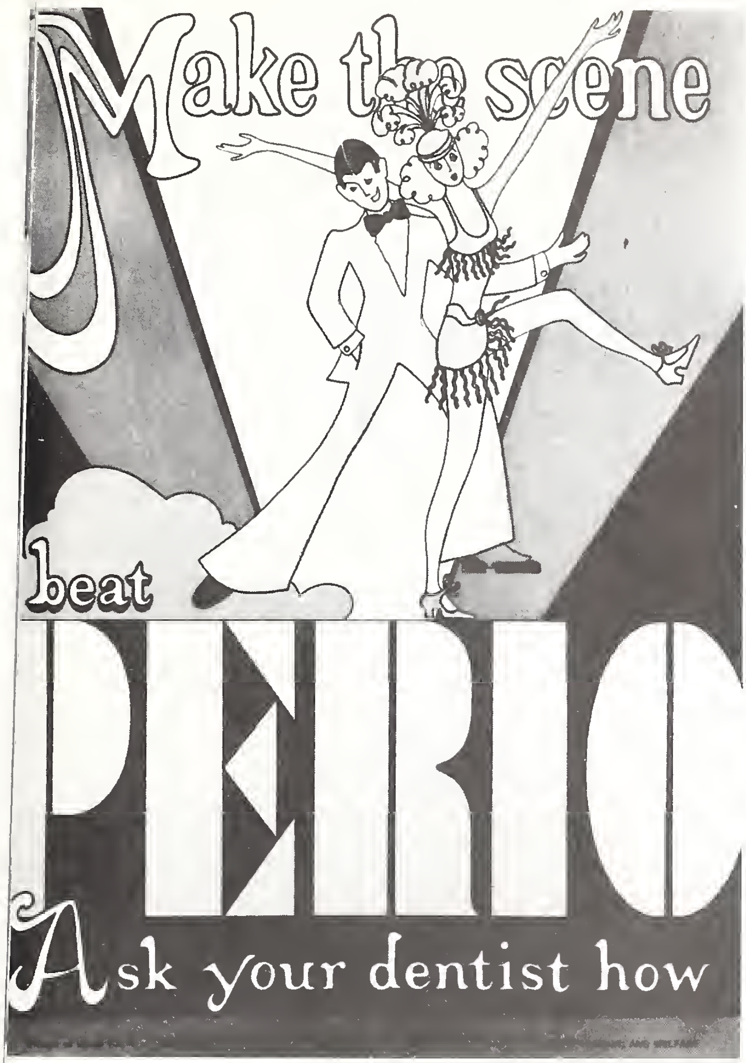
NIH RELEASES FOUR POSTERS URGING PERIO-PREVENTION



"DENTAL FLOSS, *a life line for a life time of good dental health," says one of the panels of a new poster recently released by the Division of Dental Health of the National Institutes of Health, which urges to start early, floss daily, remove plaque, and (above) keep teeth for life. The color poster, along with three others dealing with the prevention of periodontal disease, is available free from the Office of Communication Services, DDH, Federal Building, Bethesda, MD 20014.*

(more)

Dental Floss (Cont'd)



everybody's doing it
FLOSSING
BETTER ASK YOUR DENTIST HOW
Division of Dental Health
National Institutes of Health
Public Health Service
U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

ree of the four colorful posters stressing e prevention of periodontal disease, which ve recently been released by the NIH vision of Dental Health are pictured here. e Division is part of the Bureau of Health npower Education. Single copies are avail- ble free from the Office of Communication ervices, DDH, Federal Building, Bethesda, D 20014.

..keep your
Pull Strings
we call it flossing
..as your dentist...
you how...
Division of Dental Health — National Institutes of Health — Public Health Service — U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

#

Photo Feature

Changing High Risk Behavior...

STANFORD MASS MEDIA CAMPAIGNS ATTEMPT TO PREVENT HEART DISEASE

Stanford University researchers have launched a new program to combat heart disease through the use of mass media behavior change campaigns. This represents the first time the media will be used in a community setting in an attempt to persuade people to change high risk habits. Scientists will also critically evaluate whether or not the media can play an important role in changing behavior. This program has been in the planning stage since it was established a year ago with support from the National Heart and Lung Institute.

Here, Stanford communications professor Dr. Henry Breitrose and graduate film student Sandy Northrup edit one of the television spots to be used in the campaign. (NIH Photo #954)

(more)

Heart Campaign (Cont'd)

"Our message will be a simple one--minor changes in a person's daily activities can significantly reduce his heart disease risk factors."

This is how Dr. Henry Breitrose describes the new Stanford University mass media campaigns against heart disease. Dr. Breitrose, associate professor of communications, is a member of the interdisciplinary research team responsible for the campaign. Dr. John W. Farquhar, associate professor of medicine at Stanford's School of Medicine, heads the team.

This project represents the first time that newspapers, television, and radio will be employed in a behavior change effort at the community level. Conducted in both English and Spanish, the campaigns will utilize radio and television spots, press releases, recipe columns, a "cooking for your heart health" cookbook, and possibly other media.

The program was initiated a year ago last June with the establishment at Stanford of a Lipid Research Clinic and Specialized Center of Research (SCOR) in arteriosclerosis by the National Heart and Lung Institute.

Two California towns--Watsonville and Gilroy--will receive the initial mass media behavior change campaigns for over a period of nine months. The high risk habits and factors which will be targets of the campaign include: smoking, physical inactivity or lack of exercise, excessive weight gain, and consumption of increased amounts of cholesterol, saturated fats, sugar, salt, and alcohol. Physicians have long associated these things with heart disease.

(more)

To determine the success of the campaigns, a random sample of 500 individuals per town will be selected for before-and-after comparison of heart disease risk factors such as blood pressure, body weight and levels of blood sugar, fats, and cholesterol.

Initially, home interviews will be conducted with individuals in the random samples to explain the nature and goals of the project. Then, a survey center will be established in each town, where those in the sample will be given physical examinations and tested for prevalence of heart disease risk factors.

"At the end of the year," Dr. Farquhar explains, "we'll come back to check the same things in these same people. In addition to behavior change, we'll be looking for beneficial changes in attitude, motivation, and information."

A subgroup of certain high risk individuals will receive an intensive follow-up campaign. These "triggering" sessions will consist of frequent meetings of the high risk group with "change agents" from the Stanford research team in an encounter group atmosphere.

The before-and-after aspect of the project distinguishes it from previous behavior change efforts. "Money has been spent in the past on media campaigns to change behavior and get people to do the right thing," Dr. Farquhar says, "but no attempt was made to find out whether they worked."

Dr. Nathan Maccoby, professor of communication, is co-principal investigator of the project with Dr. Farquhar. The media campaign is directed by Janet Alexander of the Department of Communication. Dr. Peter Wood, senior scientist at the Medical School and deputy director of the program, will supervise testing for levels of blood lipids.

#

NEWS & FEATURES From NIH October 25, 1972

Photo Feature

DRS Experts...

GLASSBLOWERS AT NIH SHOW UNUSUAL TALENT

A MICROPIPETTE with five barrels (infinitesimal tubes that may be seen only through a microscope), is used by NIH scientists for neural cell research. The device was developed in the Glassblowing Unit of the Biomedical Engineering and Instrumentation Branch of NIH's Division of Research Services. (NIH Photo #955)

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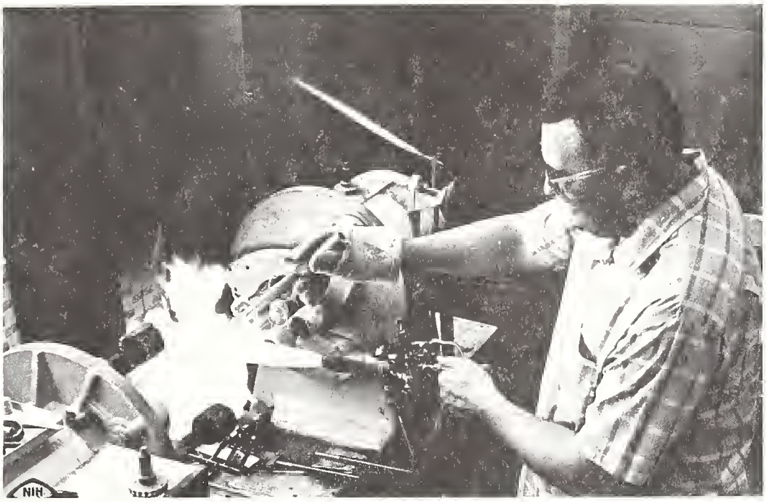
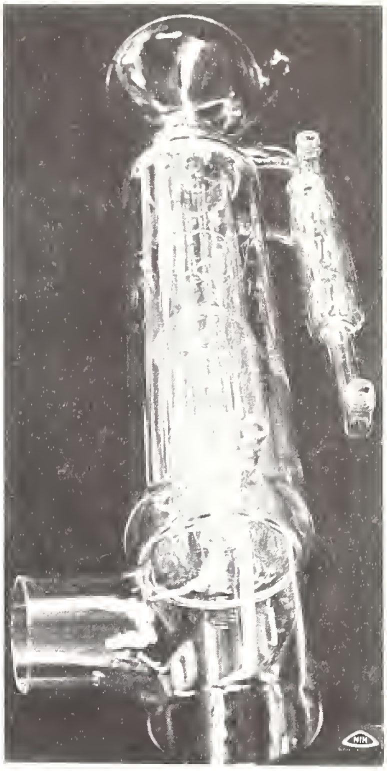
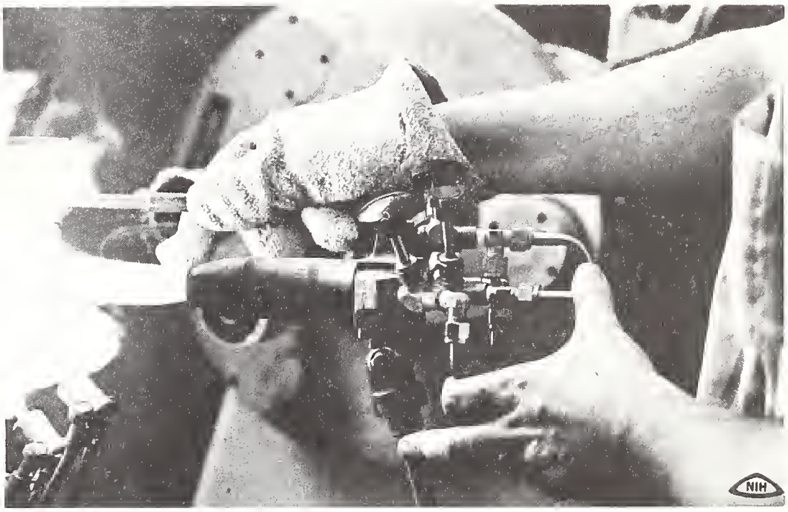
Glassblowers (Cont'd)







SCIENTIFIC GLASSBLOWING requires talent, patience, artistry, and an awareness of the chemical and physical principles involved in glass-making. Glassblowers at NIH provide research scientists with a variety of equipment devised and constructed to meet demanding technical specifications. William Dehn (upper left) of the Glassblowing Unit of NIH's Division of Research Services, begins work on a diffusion pump. (NIH Photo #956). A finished diffusion pump, used to eliminate gases and vapors in vacuum systems, is shown upper right. (NIH Photo #957). Glassblower Walter Gladd (lower left) is holding oversized cold traps which he made for freezing liquids. (NIH Photo #958). An NIH glassblower controls the intricate mechanism of a highly pressurized burner in the picture at lower right. (NIH Photo #959)

#

NEWS & FEATURES From NIH October 25, 1972

Medical News Tip

(Highlights of NIH intramural activities and extramural research projects which can provide many story leads for science writers.)

HELP FOR THE HEALTH MANPOWER SHORTAGE--The use of physician's assistants can expand medical care and reduce its cost, especially in inner-city and rural areas. People in this relatively new occupational category--also called physician's associates, Medical Services Assistants, or Medex--are trained to perform tasks which doctors usually perform, even though the skills and training of a doctor are not required. This frees the physician to treat additional patients.

During the first year of a Bureau of Health Manpower Education program supporting the training of physician's assistants, more than $6 million in contracts and grants was awarded to institutions in 26 states and the District of Columbia.

Approximately 1300 physician's assistants will receive training in the

(more)

Dartmouth Medical School received the largest award, $327,412, to train physician's assistants. In classes like the one pictured above, Dartmouth students will be trained for service in rural areas of New England. (NIH Photo #960)

(more)

projects supported by the one-year contracts. The training varies widely, with the actual training period ranging from one to five years and ending with the award of a degree or certificate. Graduates assist physicians practicing family medicine, internal medicine, obstetrics, pediatrics, or emergency medicine.

Tasks performed by the assistants may include collecting and organizing information to help the physician arrive at a diagnosis, carrying out treatment as prescribed by the physician, and attending emergencies.

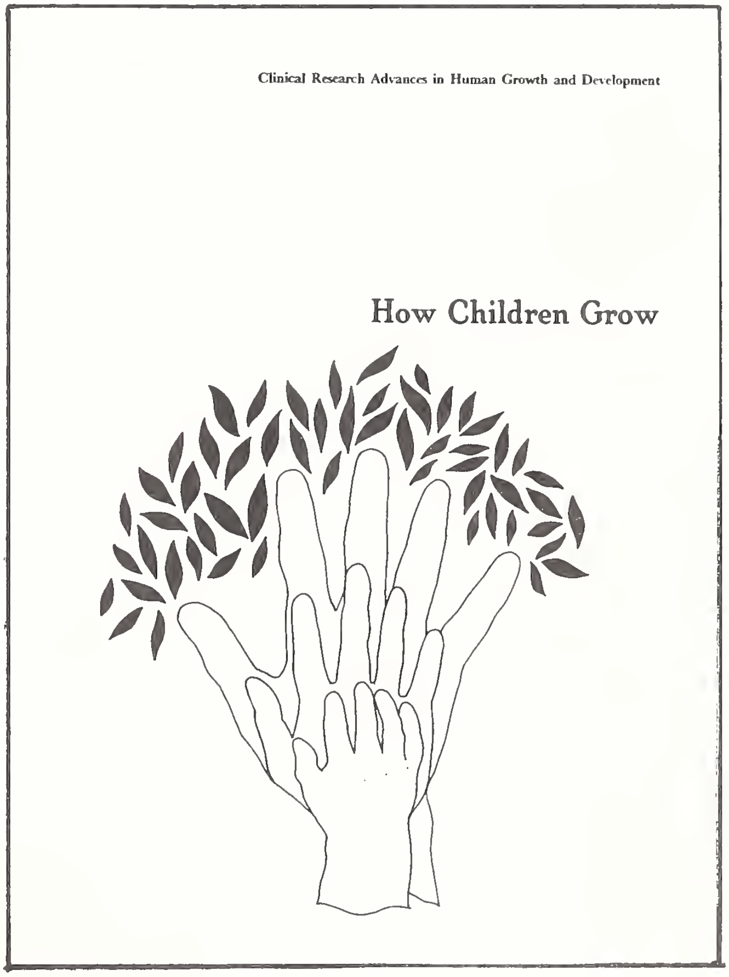
For additional information about the physician's assistant training program, contact:

Information Office, BHME
Bldg. 31, Room 5B-63
NIH, Bethesda, MD 20014
Phone: (301) 496-6011

#

New Publication:
How Children Grow

Infant survival is inversely correlated with birth weight: the lower the weight of the newborn, the greater danger the child faces. By focusing on the unique problems of low birth weight babies, scientists may be able to cut the infant death rate in half and perhaps eliminate the major cause of brain damage in children.



Clinical Research Advances in Human Growth and Development

How Children Grow

How Children Grow, a new booklet from the NIH Division of Research Resources (DRR), reports on intensive studies of infants who fail to grow to normal size before birth. In addition to this chapter on low birth weight infants, the booklet includes sections on intrauterine growth; the effect of nutrition, hormones, illness, and emotion on childhood growth; and the role of obesity and puberty on adolescent growth.

Background information for the new booklet comes from the DRR General Clinical Research Centers program. Within a recent one-year period of the program, more than 1,500 separate studies on human growth were conducted in

(more)

General Clinical Research Centers.

Science writers may obtain a copy of this publication from:

Information Office
Division of Research Resources
Building 31, Room 4B-03
NIH, Bethesda, MD 20014
Phone: (301) 496-5545

#

News Releases Issued

(Summaries of NIH releases sent out since the last issue. For a copy of any of these, please write or call.)

TEAM DENTISTRY--This year, eight additional U.S. dental schools will begin teaching dental students the techniques of working with paraprofessionals. The Division of Dental Health has awarded nearly $1.4 million in grants to support the new TEAM (Training in Expanded Auxiliary Management) programs at eight colleges and universities in this country. TEAM grants help dental schools teach students to work with, supervise, and manage a group of auxiliaries (paraprofessionals) trained to perform many duties that were previously performed only by dentists. The TEAM grants program began in 1971, following the completion of a 5-year study conducted by the Division which showed that by working with such a team, a dentist could more than double his productivity without sacrificing quality.

PRECEPTORSHIP TRAINING--More than $1 million in additional special project grants for preceptorship training of medical students in primary care has been awarded by the Division of Physician and Health Professions Education (DPHPE). The 19 grants bring to almost $3 million the amount awarded during the first year of this new program for costs of instruction and student stipends. Preceptorship training is designed to give a medical student first-hand experience in primary care or in rural or other shortage areas. During training, which may last from one to three months, a student may work under a preceptor in a private office, group setting, or institution. More than 2,100 trainees are expected to be in the 47 preceptorship programs supported by the grants.

News Releases Issued (Cont'd)

EMERGENCY MEDICINE--DPHPE has awarded a contract to the American College of Surgeons (ACS) to develop and conduct a model seminar program to instruct nonspecialist physicians in the emergency care of critically injured accident victims. The model program would be aimed at filling unmet emergency care educational needs of physicians practicing in rural areas or other areas where multispecialty teams are not readily available. Seminar topics would include treatment of shock, control of massive bleeding, and treatment of life-endangering burns. The ACS will conduct at least 16 trauma treatment seminars in medical schools in various parts of the country.

FELLOWSHIP PROGRAM--The National Cancer Institute has announced a new Clinical Cancer Fellowship Program which offers support to qualified physicians and dentists for advanced training with major emphasis on cancer. Open to post-residents, practicing physicians, and dentists, the program is designed to provide opportunities for additional training in specialty fields which emphasize management of patients with cancer. These Fellowships must be held in institutions with a demonstrated interest and capability throughout all departments to provide for the study and care of cancer patients. Only American citizens, persons lawfully admitted for permanent residency, or non-citizen nationals may be grantees under this program. Deadline for application submission is January 2, 1973. To apply, contact:

Mrs. Helen W. Denson, Fellowship Specialist
Division of Cancer Grants
NCI, Westwood Building, Room 849
5333 Westbard Avenue
Bethesda, MD 20016
Phone: (301) 496-7895

TRAINING ALLIED HEALTH WORKERS--The Division of Allied Health Manpower has awarded a 14-month contract to the consulting firm of Booz, Allen, and Hamilton to study the most common problems impeding efficient and effective clinical training in the allied health professions and to make recommendations for actions to overcome them. Recent trends in the education and utilization of allied health manpower will be studied and reconciled by the consulting firm and a 13-member Task Force of experts in the health and education fields. The trends include new and different health service responsibilities of allied health workers, greatly expanded training responsibilities assumed by two- and four-year colleges, and increasing economic pressures on hospitals which until now have provided most of the clinical training for allied health workers from their own budgets.

#

Editors of Publications May Request Glossy Prints of Numbered Photographs That Appear in the Regular Issue.

NEWS & FEATURES From NIH
National Institutes of Health
Building 31, Room 2B-10
Bethesda, MD 20014

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IEWS&FEATURES FROM NIH

EPARTMENT OF HEALTH, EDUCATION, AND WELFARE ▪ Public Health Service ▪ National Institutes of Health ▪ Office of Information ▪ Bethesda, Maryland 20014

November 10, 1972

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(301) 496-1206

NEWS & FEATURES From NIH November 10, 1972

Research Advances

NEW TECHNIQUE IDENTIFIES SICKLE CELL GENE IN FETUS

A technique for identifying fetal hemoglobins is sensitive enough to detect the sickle cell trait in a 15-week-old fetus. The procedure should permit prenatal diagnosis of sickle cell anemia and therefore enhance the effectiveness of prenatal genetic counseling in cases at risk.

National Institute of Arthritis, Metabolism, and Digestive Diseases (NIAMDD) grantee Dr. David G. Nathan of the Children's Hospital Medical Center, Boston, recently reported these findings. The study of the potential for intrauterine diagnosis of sickle cell anemia also received support from the National Institute of Child Health and Human Development.

Sickle cell anemia results from defects in the hemoglobin molecules within red blood cells which carry oxygen throughout the body. Depending on whether one or both parents contribute a gene for sickle cell hemoglobin (known as hemoglobin S) to the genetic makeup of their offspring, the disease may be present in either the relatively benign *heterozygous* carrier form (called the sickle cell *trait*) or the severe *homozygous* form (called sickle cell *anemia*).

According to the grantee, the diagnosis of sickle cell anemia is frequently made only after an affected child is born. Although currently-used screening tests for the sickle cell gene are effective, no method exists for diagnosing this important genetic abnormality in the fetal state.

(more)

Recently, other scientists have shown that normal human fetuses synthesize hemoglobin A (the predominant type in the adult) and have predicted that the abnormal fetal hemoglobin would also be detectable.

In the present study, the investigators took umbilical cord blood from three fetuses aborted for medical reasons. Through tests, they verified the presence of beta A and beta S (sickle cell) hemoglobin chains in this blood and therefore demonstrated that the diagnosis of sickle cell trait in a first-trimester fetus can be accurately established. This ability to detect the heterozygous state suggested to them that the diagnosis of fetal homozygous sickle cell disease should be established without difficulty.

The investigators also obtained evidence indicating that direct sampling of fetal blood would not be necessary for the detection of abnormal hemoglobin synthesis. The extraordinarily high rate of hemoglobin synthesis in fetal cells in relation to maternal cells makes it likely that mixed blood obtained by aspiration of the placenta will be sufficient for intrauterine diagnosis. The maternal cells have a lower rate of hemoglobin synthesis and therefore would not mask the high rate of hemoglobin synthesis in the fetal cells.

The new procedure should permit genetic counseling focused on the particular pregnancy at risk and ultimately, prenatal diagnosis of various forms of thalassemia--another hereditary disorder of hemoglobin--as well. However, the investigators warn that considerably more information will be required before the methods can become generally available.

(more)

In the first place, the feasibility and safety of taking red cells from the fetus by aspiration of the placenta or by other means must be established. Secondly, the ability to confirm the diagnosis of either disorder in the first trimester must be proved by experience. Lastly, acceptance of the procedure by patients must be ascertained.

The NIAMDD grantee and associates Drs. Yuet Wai Kan, Andrée M. Dozy, Blanche P. Alter, and Fredric D. Frigoletto, reported their results in the *New England Journal of Medicine*, July 6, 1972.

#

Research Advances

B Virus Infection...

STUDY RELATES HEPATITIS
TO SOCIOECONOMIC STATUS

Hepatitis remains a major unsolved problem in spite of increased research focused, largely, on hepatitis B. (This is the more serious form of the disease which is generally believed to be transmitted by contaminated needles or blood.) Transfusions of blood from paid donors are particularly risky presumably due to the fact that commercial blood banks undoubtedly attract persons--such as drug addicts--in need of a quick source of funds.

Studies in foreign populations have suggested, however, that there can be vast differences in the degree of dissemination of the hepatitis B viral agent. Furthermore, scientists have theorized that the degree of exposure to the agent may depend upon socioeconomic factors other than prevalence of drug addiction in the environment.

To test this theory, investigators at the New York Medical College, in cooperation with the National Institute of Allergy and Infectious Diseases (NIAID) scientists, have carried out blood studies of three socioeconomically diverse populations in the New York City area. The study populations included admissions to Harlem Hospital, a municipal facility serving a low socioeconomic status black population; admissions to Staten Island Hospital, a voluntary hospital serving a middle socioeconomic class white population; and consecutive patients of high socioeconomic status seen in a Park Avenue internist's practice.

(more)

Using a highly sensitive detection technique, the investigators found that the frequency of hepatitis B infection, as revealed by the presence of antibody to hepatitis B antigen, was directly related to the age of individuals studied and inversely related to their socioeconomic status.

In all groups, little antibody was acquired before 20 years of age. Between the ages of 20 and 50, there was a striking rise in antibody with no increase found thereafter.

By age 50, in the low socioeconomic group (Harlem), antibody was present in 43% of the persons studied; in the middle income group (Staten Island), 22%; and in the high socioeconomic group (Park Avenue) only 15%.

The investigators concluded that exposure to hepatitis B, similar to many infectious agents, is greatest for individuals living in a low socioeconomic environment. In addition, the scientists felt that the frequency with which antibody to hepatitis B antigen was found in all populations studied could not be explained solely on the basis of transfusion or drug addiction. Infection in most individuals must have been subclinical and acquired by a non-parenteral or an undetected parenteral route.

According to the scientist, if the high rate of exposure to hepatitis B virus detected in the present study can be confirmed, it means that the reservoir of hepatitis B in the general population is far larger--and the resulting public health problem far greater--than previously thought.

Drs. Robert H. Purcell and Jerrold J. Lander, NIAID, and Charles E. Cherubin, Thomas G. McGinn, and Lawrence A. Cone, New York Medical College, reported their findings in the July 22 issue of *Lancet*.

#

Research Advances

RUBBING WITH CALCIUM ACID PHOSPHATE REDUCES TOOTH ROOT SENSITIVITY

Rubbing exposed tooth roots firmly with calcium acid phosphate reduces sensitivity to touch, foods, and temperature changes, according to National Institute of Dental Research supported scientists.

Dr. William Hiatt of Denver, Colorado, and Dr. Erling Johansen of Rochester, New York, noticed that certain patients developed a glossy, plaque-free surface on exposed tooth roots as the result of regular, vigorous home care with toothbrush, tooth pick, and dental floss. Their roots were never sensitive, in comparison to the roots of other patients, who were less conscientious or skillful in personal hygiene.

Studies of both types of roots showed that the teeth vigorously rubbed for several years felt harder under pressure from an instrument called an explorer and appeared more mineralized in microradiographic tests than poorly polished, sensitive teeth. The electron microscope showed that in the glossy teeth, most of the fine tubes which pierce the bone-like dentin were blocked with a crystalline material that resembled calcium acid phosphate. It was assumed that the crystals probably protected the sensitive, nerve-filled pulp inside the tooth by blocking the tubules.

The investigators rubbed the exposed, sensitive tooth roots of 108 patients with a fine-ground paste of calcium acid phosphate for one minute, and they polished the teeth of 20 other sensitive patients without the

(more)

paste. Questioned approximately a week later about their comfort, 93 of the group using the paste reported relief from root sensitivity. Only five of the 20 that had rubbed without paste obtained some relief. Examinations of some of the paste-polished roots showed that their dentinal tubules were blocked in the same way as in those glossy from good home care.

The investigators found that even though sensitivity was usually relieved by their treatment, continuous, careful home care was necessary for maintaining comfort since sensitivity tended to recur after awhile in plaque-covered areas missed by the patients.

The investigators reported their findings in the June 1972 issue of the *Journal of Periodontology*.

#

NEWS & FEATURES From NIH November 10, 1972

News Feature

NIH PROTEIN CHEMIST WILL GO TO STOCKHOLM

The Anfinsen family is going to Stockholm next month (December) to watch Christian B. Anfinsen, Ph.D., receive part of the Nobel Prize in chemistry.

The family--including three children, all married--is a close one that shares many interests and trips in spite of the busy laboratory schedule of Dr. Anfinsen. He is Chief of the Laboratory of Chemical Biology of NIH's National Institute of Arthritis, Metabolism, and Digestive Diseases.

Dr. Anfinsen is an internationally-acclaimed biochemist and authority on protein structure and metabolism. He is primarily responsible for the generally-accepted theory that the tertiary structures of proteins are determined by their amino acid sequences.

Sharing the Nobel Prize in chemistry are two Rockefeller University professors: Stanford Moore, Ph.D., and William H. Stein, Ph.D. Dr. Moore receives research support from the National Institute of Neurological Diseases and Stroke, while Dr. Stein is a grantee of the National Institute of General Medical Sciences. They devote their research studies primarily to the biochemistry of proteins, peptides, and amino acids. Dr. Anfinsen will receive half of the prize, while Drs. Moore and Stein will share the other half.

(more)

Chemist (Cont'd)

[The American winner of the Nobel Prize in Medicine, Gerald Maurice Edelman, M.D., is another NIH grantee at Rockefeller University. The British winner of the medicine award, Rodney R. Porter, M.D., has also received some research funding from NIH. Over the years, NIH has supported the work of 55 American winners or co-winners of Nobel Prizes.]

The Nobel awarding body credited Drs. Anfinsen, Moore, and Stein with "pioneering studies that have illuminated some of the most important principles describing the chemical structure and catalytic activity of an enzyme."

The three chemists confer regularly on the progress of their work with the enzyme, ribonuclease.

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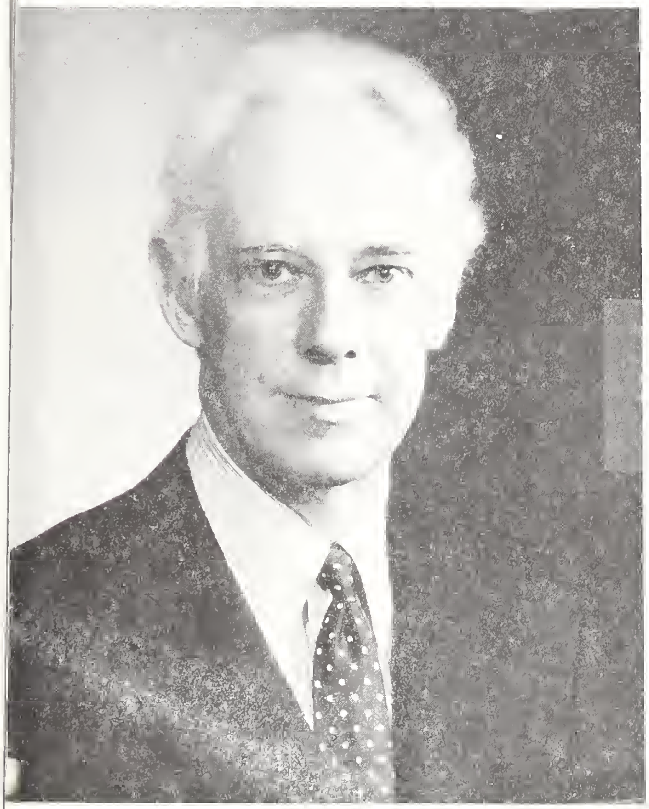


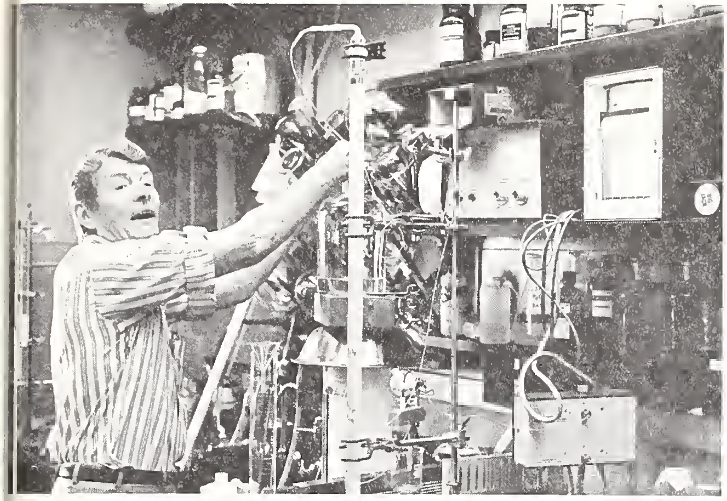
Stanford Moore, Ph.D.

William H. Stein, Ph.D.

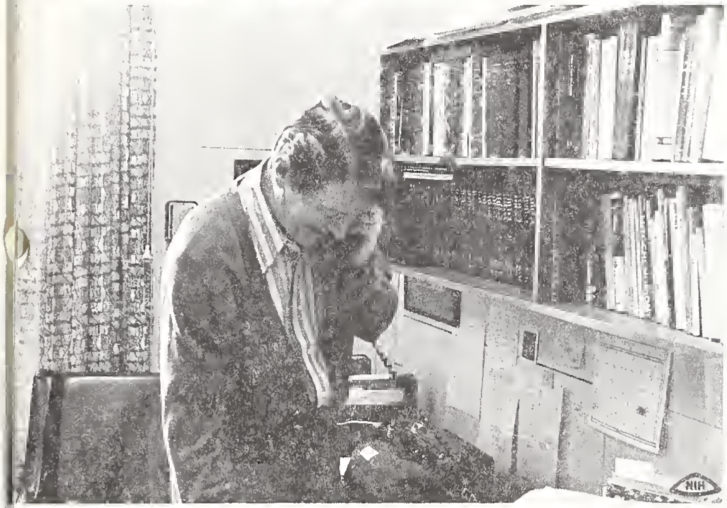
Anfinsen (Cont'd)

October 20, 1972

9:20 a.m.: Dr. Christian B. Anfinsen was in his NIAMDD laboratory performing column chromatography on a mixture of proteins when he received a phone call from a reporter.
(NIH Photo # 961)



The reporter asked his reaction to the news that he was to share the Nobel Prize for chemistry. "I can't believe it!" he answered.
(NIH Photo #962)



9:30 a.m.: Word spread quickly through his laboratory, and his co-workers massed in his office to congratulate him.

NIH information staff members taped a message for radio stations, arranged a press conference for 1:30 p.m., and began photographing him.

9:40 a.m.: NIH Director Dr. Robert Q. Marston was notified in Cleveland where he had traveled to attend a ceremony honoring Dr. Robert S. Gordon, Jr., another NIAMDD scientist. Dr. Gordon shared the Stouffer Prize for achievement in research related to metabolism and fat transport. He is NIAMDD Clinical Director. Dr. Marston returned to Washington on the first possible flight.

1:30 p.m.: Dr. Marston (left) and NIAMDD Director Dr. G. Donald Whedon (right) praised Dr. Anfinsen's work and introduced him to reporters from news services, newspaper, magazines, and television networks.
(NIH Photo #963)

Dr. Anfinsen discussed his research into basic science, his love of classical music and sailing, his three children--all married, the family dogs, and his hope that more attention would be paid to basic biomedical research.
(NIH Photo #964)

#

Photo Feature

NATIONAL BREAST CANCER PROJECT TO EVALUATE TREATMENT METHODS

A research effort directed by Dr. Bernard Fisher of the University of Pittsburgh Medical School will investigate the effectiveness of surgery, radiation, and drug therapy in the treatment of early breast cancer. Breast cancer is the leading cause of cancer deaths among women in the United States, according to the National Cancer Institute (NCI).

Here, Dr. Fisher, professor of surgery at the University and chairman of the National Surgical Adjuvant Breast Project (NSABP) checks patient progress in the Project. Under the NSABP, a study evaluating cancer recurrence among women treated by total versus radical mastectomy procedures is now being carried out. The existing project will also extend a study in post-surgical breast cancer patients of the effects of long-term treatment with the drug L-phenylalanine mustard (L-PAM), used to eradicate cancer cells which may remain after surgery. The study will determine whether this additional therapy will help prevent a recurrence of breast cancer among patients treated by radical mastectomy.

A combination of NCI research contract and grant funding will be utilized to stimulate participation in this study by other research institutions. An award of $474,000 for the first year from NCI will support and extend the investigation. (NIH Photo #965)

#

Photo Feature

Valuable Teaching Tool...

NIDR SUPPORTS RESEARCH IN COMPUTER ORTHODONTICS

"They fly airplanes, build bridges and tunnels, all in computers, after building one prototype model. We can do the same thing in treating jaw and teeth malformations."

These are the words of Dr. Geoffrey F. Walker, whose work in computer-assisted orthodontics at the University of Michigan Dental School is supported by the National Institute of Dental Research.

Dr. Walker operates a digitizer, the key device for converting profile skull X-rays into the skull outline maps which are stored in the computer's memory and on punch cards. After they are fed into the computer, the outlines can be reproduced at any time as well as analyzed and evaluated in comparison with other skulls. Dr. Walker's work in computer-assisted orthodontics is supported by the National Institute of Dental Research at NIH. (NIH Photo #966)

Dr. Walker's prototype is some 15,000 skull profile X-rays taken over a period of years. He and his research team have developed a new approach--a combination of statistics, mathematical models, and electronic technology--to convert these X-rays to x-y coordinate maps of the skull and jaws. These models or maps are automatically converted to punch cards or transferred directly via telephone lines into the memory bank of a large computer.

(more)

This combination of dental science and computer technology has produced the first statistically reliable pattern of human skull and jaw growth. The key to the success of this new method is the speed and accuracy with which the researcher or clinician can extract many thousands of measurements and growth changes. These become the basis for better methods of diagnosis, monitoring, and treating dental and facial problems.

With one skull X-ray, Dr. Walker can now project the typical skull maturation patterns with an approximate 70% possibility of successful matching. Given two more X-rays, spaced at least six months apart, their batting average goes up by a considerable margin.

With the aid of computer-assisted orthodontics, an orthodontist (or a dental student) can see the changing growth pattern of normal and abnormal cases in minutes instead of waiting years for the same events to unfold in his practice.

If, for example, the orthodontist wishes to know how his patient will change in the next several years, a special computer program will project the most probable natural growth without any changes due to treatment. He then decides upon a treatment plan and enters into the console the orthodontic forces needed to carry out the plan. The computer "applies" this treatment to the patient's computer model and calculates

This is a TV display of the computer reproduction of a skull map. The advantage of the TV display is that skull outlines can be called out of the computer's memory bank, evaluated and changed--if necessary--in seconds. (NIH Photo # 967)

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and displays all the changes that would occur. If not entirely satisfactory, the treatment forces can be altered and re-entered into the console and a new plan is run.

Thus, several varying treatments may be tested in a very short time, and the student or orthodontists can simulate years of growth supervision and months of treatment in a few minutes with a very high percentage probability of success. All this before even touching the patient.

Using techniques such as this, Dr. Walker estimates that the University of Michigan will be able to graduate an orthodontist in one or two years of graduate work who is better qualified in terms of experiences than some dentists who are near retirement.

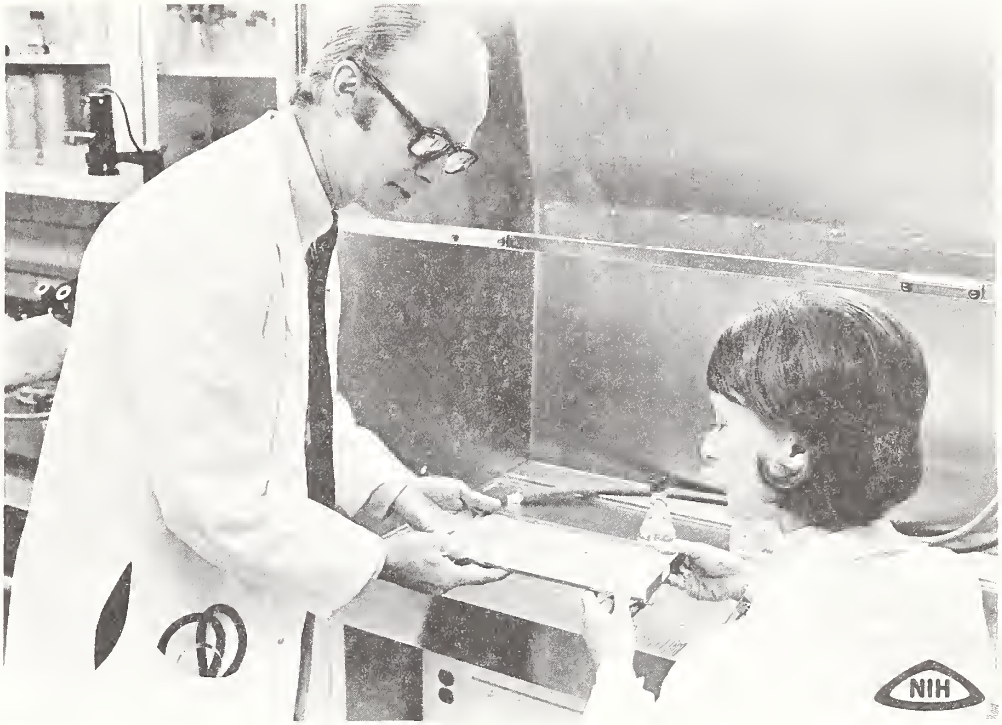
"Where the average orthodontic practitioner may only see a dozen of certain jaw abnormalities in 20 years of practice," he explains, "the data banks will have hundreds on file from which the student can learn."

#

Photo Feature

For Ten-County Area...

SCIENTISTS PROVIDE AMNIOCENTESIS DATA



A ten-county amniocentesis service available to physicians in upstate New York is based at the University of Rochester Medical Center. Richard A. Doherty, M.D., who directs the Center's Laboratory for Prenatal Detection of Birth Defects, has research support from the National Heart and Lung Institute. He is shown with Jeannette Felix, Ph.D., checking cultures of amniotic fluid cells (above) and evaluating a karyotype (left). The karyotype is a systematized arrangement of the chromosomes of one cell. This service to physicians is believed to be one of only a few of its kind in the country. (NIH Photos #968 (above) and #969 (left).)

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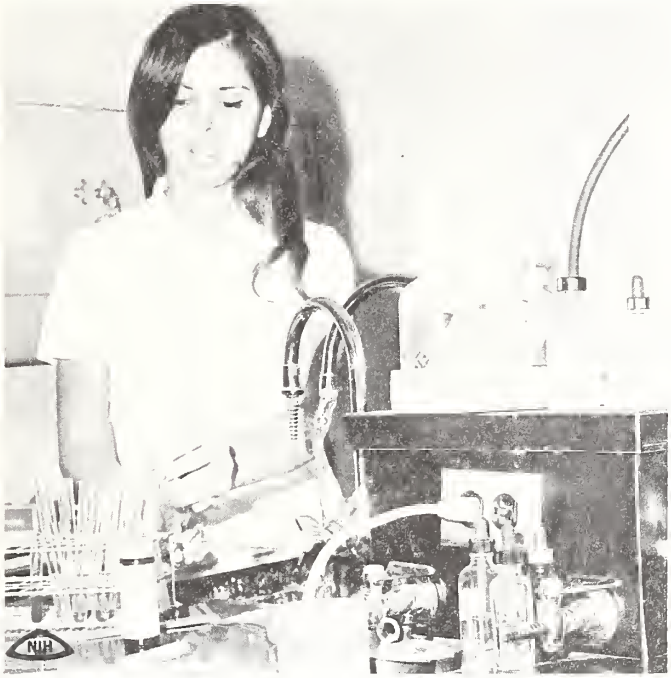
Photo Feature

NEW MEXICO STUDENTS TRAIN AS LAB WORKERS

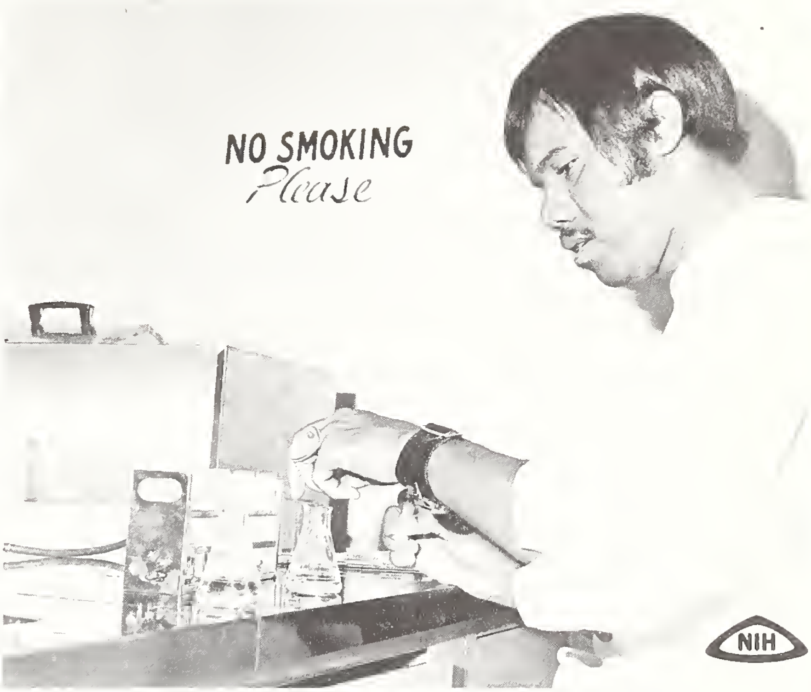


Well-trained laboratory workers are important to small community hospitals in states like New Mexico where small communities are far apart. The Laboratory Sciences Program at the University of New Mexico School of Medicine encourages students like Monica Lobato, who lives at Blanco Trading Post, to complete their training and return to their hometown hospitals. The program is supported by funds from the Division of Allied Health Manpower of the NIH Bureau of Health Manpower Education. (NIH Photo #970)

Muryl Hart Welch found that the certified laboratory assistant training program was "tailor-made" for students with various handicaps. The certified medical laboratory assistant performs the less complicated chemical, hematological, and microbiological tests under the supervision of medical technologists, physicians, and other laboratory professionals. The BHME grant to the University of New Mexico enables the school to train students in this and other allied health fields. (NIH Photo #971)

(more)

Lab Workers (Cont'd)



The allied health grant from NIH helped the University of New Mexico expand existing training programs for medical technologists, medical lab assistants, X-ray technologists, nuclear medicine technologists, and dental hygienists and train more students like Ollis Lewis. The grant also enabled the school to begin planning programs for dietitians and physical therapists. (NIH Photo #972)

Warren Second, an Apache Indian from the Mescalero Reservation, entered the laboratory assistant training class at the University of New Mexico after working as a summer trainee at Mescalero Hospital. Students in this program spend six months training at the University's labs and then six months training in a hospital lab, often in their hometowns or in a rural New Mexico community. Under the allied health grant, NIH now funds one-third of the laboratory sciences programs at the school. (NIH Photo #973)

#

NEWS & FEATURES From NIH November 10, 1972

Medical News Tip

NINDS WORKS TO IMPROVE MYASTHENIA GRAVIS THERAPY--During the past two decades, scientists have reported significant reductions in mortality and morbidity from myasthenia gravis (MG), a neuromuscular disease characterized by weakness and abnormal fatigue of the voluntary muscles. This success is due in part to the work of the National Institute of Neurological Diseases and Stroke's (NINDS) myasthenia gravis research program.

The exact cause of MG remains unknown, but numerous NINDS-supported studies have pinpointed the trouble as existing somewhere along the motor unit which consists of the lower motor neuron and the muscle fibers it activates. Animal models, developed by Institute grantees, may help explain the possible immunological aspects of the disease. Studies of twins and family groups are helping to establish whether or not inheritance plays a role in the disease.

NINDS scientists also report advances in the treatment of the disease. Therapy with ACTH (adrenocorticotrophic hormone) benefits severely ill MG patients as does a high single-dose alternate-day program of oral prednisone treatment. Still other promising drugs are undergoing testing in NINDS-supported laboratories.

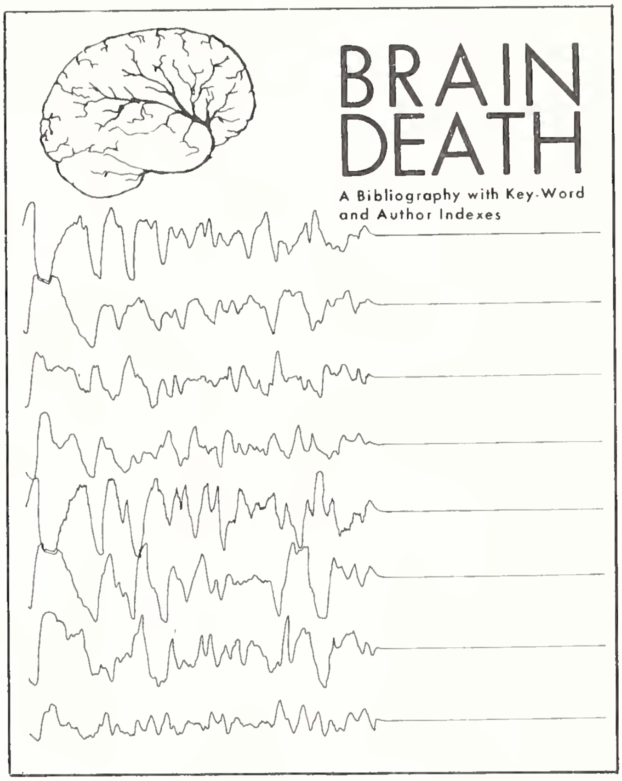
Thymectomy (removal of the thymus) is another beneficial therapy in treating MG.

For additional information about the NINDS myasthenia gravis research program, contact:

NINDS Information Office
Bldg. 31, Room 8A-03
NIH, Bethesda, MD 20014
Phone: (301) 496-5751

#

NEW PUBLICATION:
Brain Death



BRAIN DEATH

A Bibliography with Key-Word and Author Indexes

The urgent need to redefine the death of an individual in terms of brain death is an example of the impact of science on society. In response to this need, the National Institute of Neurological Diseases and Stroke launched a Collaborative Study of Cerebral Death in July 1971. Eight clinical centers and a coordinating center participated.

In order to support those planning and participating in the study, an in-depth review of brain death literature was carried out. In response to the numerous requests for this information, *Brain Death*, a bibliography with key-word and author indexes, was published by the Institute.

The titles and authors contained in the bibliography illustrate the diversity of interest in the subject of brain death. The Institute made no attempt to judge the value of the articles.

The bibliography was designed to assist not only physicians and lawyers, but anyone interested in the subject. *Brain Death* may also be useful to science writers and editors.

For a copy of this publication, contact: Information Office, NINDS, Bldg. 31, Room 8A-03, NIH, Bethesda, Md. 20014, Phone: (301) 496-5751.

#

News Releases Issued

(Summaries of NIH news releases sent out since the last issue. For a copy of any of these, please write or call.)

HYPERTENSION--The National Heart and Lung Institute (NHLI) has awarded five new contracts and extended 10 existing contracts to expand the Hypertension Detection and Follow-Up Program (HDFP) which it initiated last year. With the addition of five clinical centers to the 10 that are already cooperating in the program, the HDFP prepares to enter its second major phase--to determine the efficacy of anti-hypertensive therapy. The information to be gained from the HDFP will contribute significantly to the recently initiated planning for a National Hypertension Program. The HDFP represents a major effort to bring to the community the fruits of years of research on high blood pressure.

NURSE MIDWIVES--A regional network to train and place nurse midwives in six Southeastern States will be set up under a contract from the Bureau of Health Manpower Education (BHME). The one year contract represents an effort to lower the high maternal-infant death rate, particularly among non-white residents in this area. Participating States are: Alabama, Florida, Georgia, Louisiana, Mississippi and South Carolina.

CANCER OF THE LARGE BOWEL--The National Cancer Institute has launched a research program on the prevention, diagnosis, and treatment of cancers of the large bowel. Grants totalling $2.5 million will be awarded for the

(more)

first year, and four additional years of support are committed. The project will include both hospital and laboratory research on cancers of the rectum and large bowel. Grants will be awarded for research on the immunology, clinical pharmacology, drug treatment, surgery, radiation therapy, and causation of these cancers. The M.D. Anderson Hospital and Tumor Institute in Houston, Texas will serve as headquarters for the project.

MINORITY HEALTH PROFESSIONALS--Grants have been awarded to support projects to identify disadvantaged students with potential for health training, help them enroll in health schools, and assist them in training. The BHME grants were awarded to 29 schools and organizations in 18 states and the District of Columbia under a new program to increase the number of minority physicians, dentists, and other health professionals. The program is concerned primarily with four groups: blacks, Spanish-surnamed Americans, American Indians, and women.

BIOMEDICAL ENGINEERING--Biomedical engineers and other scientists at Arthur D. Little, Inc. will work closely with NCI scientists to increase the Institute's capability in biomedical engineering. Under a $249,000 contract, biomedical engineers and scientists at the firm will work with NCI scientists to identify research problems amenable to solutions through biomedical engineering. Consultants will then develop and test instruments and techniques needed to solve the problems. Efforts will be targeted toward research in the development of cancer drugs.

#

NEWS & FEATURES From NIH November 10, 1972

NOTE TO SCIENCE WRITERS:

The NIH Portfolio for November highlights the nurse practitioner--the Registered Nurse who is trained to work more independently.

The need for increased and intensified medical care combined with the shortage of physicians has spurred the reshaping of a Registered Nurse's traditionally limited supportive role into a primary leadership position as part of a modern medical team.

The Federal Government has seized the initiative in this area with its Nurse Practitioner Educational Programs. Research and special projects grants and contracts administered by the NIH Division of Nursing have been applied to educational programming, planning, and feasibility studies as part of the move toward making nurses responsible for more aspects of patient care, including assessment and independent decision-making concerning treatment.

Three pieces of legislation--the Nurse Training Act of 1964, Title II of the Health Manpower Act of 1968, and the Nurse Training Act of 1971--have added both funds and impetus to the development of programs for nurse practitioners.

#

Editors of Publications May Request Glossy Prints of Numbered Photographs That Appear in the Regular Issue and NIH Portfolio on Nurse Practitioners.

NEWS & FEATURES From NIH
National Institutes of Health
Building 31, Room 2B-10
Bethesda, MD 20014

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NEWS&FEATURES FROM NIH

PORTFOLIO · 4 · NURSE PRACTITIONERS

.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE ▪ Public Health Service ▪ National Institutes of Health ▪ Office of Information ▪ Bethesda, Maryland 20014

NEWS & FEATURES From NIH

Marc Stern, Editor, [301] 496-2535
Carol M. Sussman, Associate Editor

Building 31, Room 2B-10
Bethesda, MD 20014

PORTFOLIO SERIES

1.	Genetics Research Centers	June 1972
2.	Physician's Assistants Support	August 1972
3.	Trauma Research Centers	October 1972
4.	Nurse Practitioners	November 1972

This Portfolio illustrates 14 nurse practitioner training projects established i
12 states by the Division of Nursing* under the authority of the Federal nurse training legislation. All of the projects listed below were started in 1972.

AUGUSTA, ME: Medical Care Development, Inc.; Family Nurse Practitioner; Miss Cora E.
Project Di

BALTIMORE, MD: University of Maryland; Family Nurse Practitioner; Marion I. Murphy, P
Project Director

BIRMINGHAM, AL: University of Alabama, Birmingham; Pediatric Nurse Practitioner;
Ms. Isobel H. Thorp, Project Director

BOSTON, MA: Northeastern University, Boston; Pediatric Nurse Practitioner
Juanita O. Long, Ph.D., Project Director

BOZEMAN, MT: Montana State University; Family Nurse Practitioner; Laura Walker, Ph.D.
Project Director

BROOKLYN, NY: SUNY - Downstate Medical Center; Nurse Midwifery; James H. Nelson, Jr.,
and Miss Laurette Beck, Project Di

BUFFALO, NY: SUNY - Buffalo; Pediatric Nurse Practitioner; Ms. Mary N. O'Hara, Projec
Director

CHARLOTTESVILLE, VA: University of Virginia; Pediatric Nurse Practitioner,
Barbara Brodie, Ph.D., Project Director

CHICAGO, IL: Rush-Presbyterian-St. Luke's Medical Center; Pediatric Nurse Practitioner
Joseph Christian, M.D., Project Director

Rush-Presbyterian-St. Luke's Medical Center; Medical Nurse Practitioner;
Joyce Lashof, M.D. and Mrs. Iris R. Shannon, Project Directors

GALVESTON, TX: University of Texas, Galveston; Pediatric Nurse Practitioner;
Marilyn D. Willman, Ph.D., Project Director

INDIANAPOLIS, IN: Methodist Hospital of Indiana, Inc., Pediatric Nurse Practitioner;
Gabriel J. Rosenberg, M.D., Project Director

PHOENIX, AR: Good Samaritan Hospital, Phoenix; Pediatric Nurse Practitioner;
David P. Folkestad, M.D. and Miss Nancy Melvin, Project Directors

ROCHESTER, NY: University of Rochester; Medical Nurse Practitioner, Barbara Bates, M.D
and Miss Joan Lynaugh, Project Directors

SAN FRANCISCO, CA: University of California, San Francisco; Pediatric Nurse Practition
Maternal Nurse Practitioner; Miss Betty Highley, Project Director

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*The Division of Nursing is part of the Bureau of Health Manpower Education of the National Institutes of Health. NIH is an agency of the U. S. Department of Health, Education, and Welfare.

AUGUSTA, ME--Mrs. Viola Pamacci, R.N. (left), a member of the first class in the Family Nurse Practitioner Program of Maine's Regional Medical Program, discusses clinical procedures with Doris Pennoyer, M.D. (center), project director, and Mildred A. Roche, R.N., nursing director. The program to train R.N.s as family practitioners is funded by the Division of Nursing of the National Institutes of Health. In the lower photo, Cora Pike, R.N. (right), nurse director of Maine's Regional Medical Program, discusses roles of family nurse practitioners in rural and inner city areas in Maine with Helen Connors, Executive Director of the Maine State Nurses Association. (NIH Photo #N-1 and #N-2)

BALTIMORE, MD--Nurse practitioner Thomasine Guberski (upper photo) examines a patient in the Outpatient Department of the University of Maryland Hospital. In the lower photo, Richard Troy, nurse chairman of the screening unit at the Outpatient Department obtains a patient's history (release obtained). Both nurses received their practitione preparation in a pilot program offered by the Office of Health Care Programs of the University of Maryland Schools of Medicine and Nursing last year. The present Family Nurse Practitioner program is supported by a contract from the NIH's Division of Nursing. (NIH Photo #N-3 and #N-4)

BIRMINGHAM, AL--The Pediatric Nurse Practitioner Program at the University of Alabama is supported by a training contract from the Division of Nursing of the National Institutes of Health. In the upper photo, Patricia Howard, R.N., is examining a patient (release obtained) under the guidance of Isobel Thorp, R.N., program director. In lower photo, Dr. Daisy Lee (right), the program's physician coordinator, observes as Camille Coburn, R.N., examines a patient (release obtained). Also shown is Ann Sirles (left), an instructor in the program. (NIH Photo #N-5 and #N-6)

BOSTON, MA--Discussing the new Pediatric Nurse Practitioner training program at Northeastern University are Dr. Jules Rako and his nurse, Janet Kametz, R.N., with Priscilla M. Andrews, R.N. (right). Dr. Rako is in private practice. (NIH Photo #N-7)

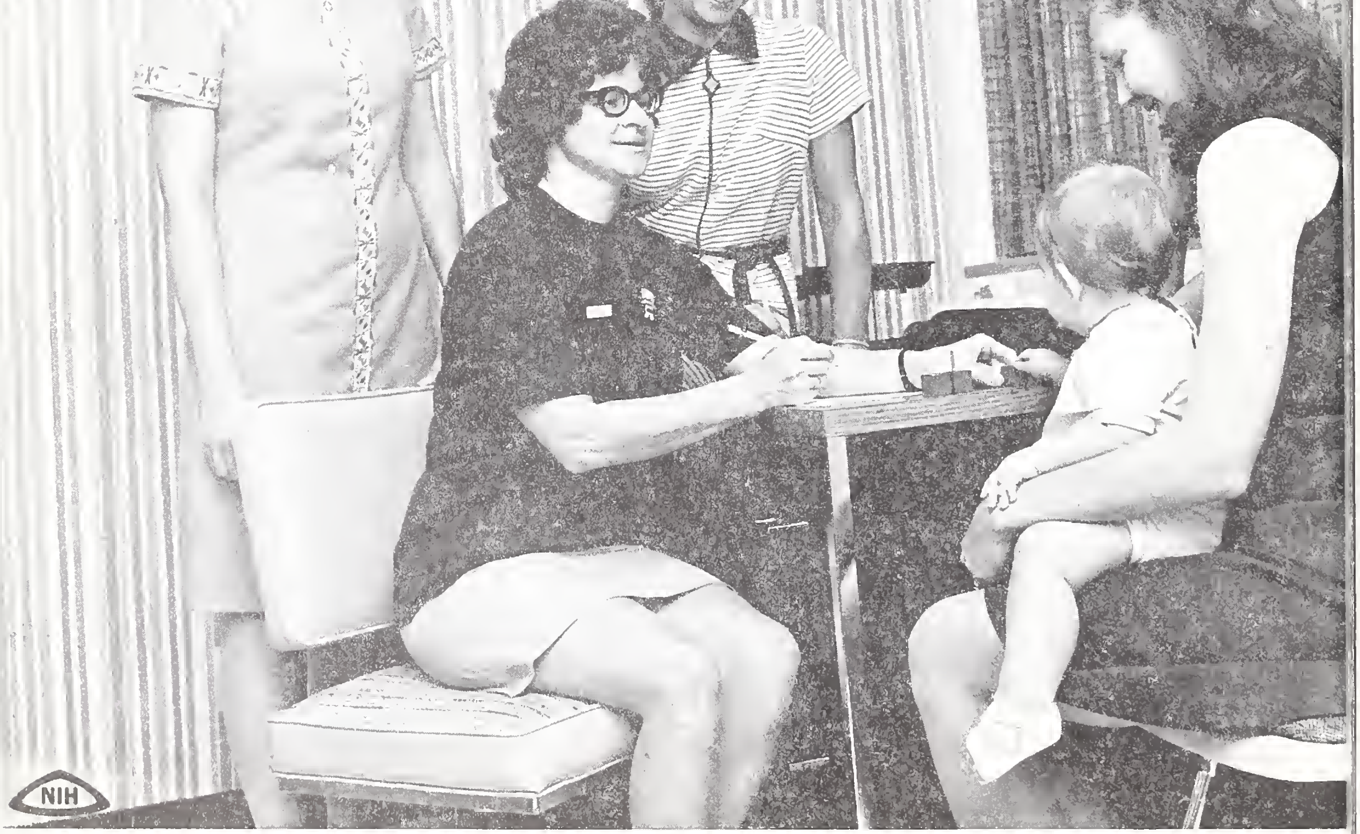
BOZEMAN, MT--Registered Nurses are being trained at the Montana State University to be family nurse practitioners. The training is supported by a contract awarded by the Division of Nursing of the National Institutes of Health. Project director is Laura Walker, Ph.D. (not shown). (NIH Photo #N-8)

BROOKLYN, NY--The Nurse Midwifery Program at Downstate Medical Center, State University of New York, is supported by a training contract from the Division of Nursing of the National Institutes of Health. June Ohashi, R.N., is shown in a maternity clinic at Kings County Hospital Center. She is giving a prenatal examination (release obtained) in the upper photo. Her duties also include taking a meaningful patient history (lower photo). (NIH Photo #N-9 and N-10)

FFALO, NY--Dr. James Markello, co-director of the Pediatric Nurse Practitioner
raining program at the State University of New York, shows a student (center) in
pper photo) how to examine a youngster's chest (release obtained). Looking on are
roject Director Mary Norma O'Hara (right) and the child's parents (left). In the
ower photo, Dr. Markello and a registered nurse talk to a mother about her
ughter's illness (release obtained). The program is supported by a training
ontract from the Division of Nursing of the National Institutes of Health. (NIH
hoto #N-11 and #N-12)

CHARLOTTESVILLE, VA--Pediatric Nurse Practitioner Patricia Finchem, R.N., examines a skeptical young patient at the pediatric clinic of the Central Virginia Community Hea Center. Mrs. Finchem is one of six highly-trained nursing specialists who perform ma of the traditional preliminary duties of the physician at the Center. Her skill enab the physician to conserve his time and helps the entire health team arrive at quicker diagnosis and treatment determinations. The Pediatric Nurse Practitioner training program is funded by a contract from the National Institutes of Health's Division of Nursing. (NIH Photo #N-13)

ICAGO, IL--The Division of Nursing of the National Institutes of Health has awarded contract to the Rush-Presbyterian-St. Luke's Medical Center to train Medical Nurse actitioners and Pediatric Nurse Practitioners. Under the guidance of a pediatrician, registered nurse is shown examining a baby at a neighborhood health center. (NIH oto #N-14)

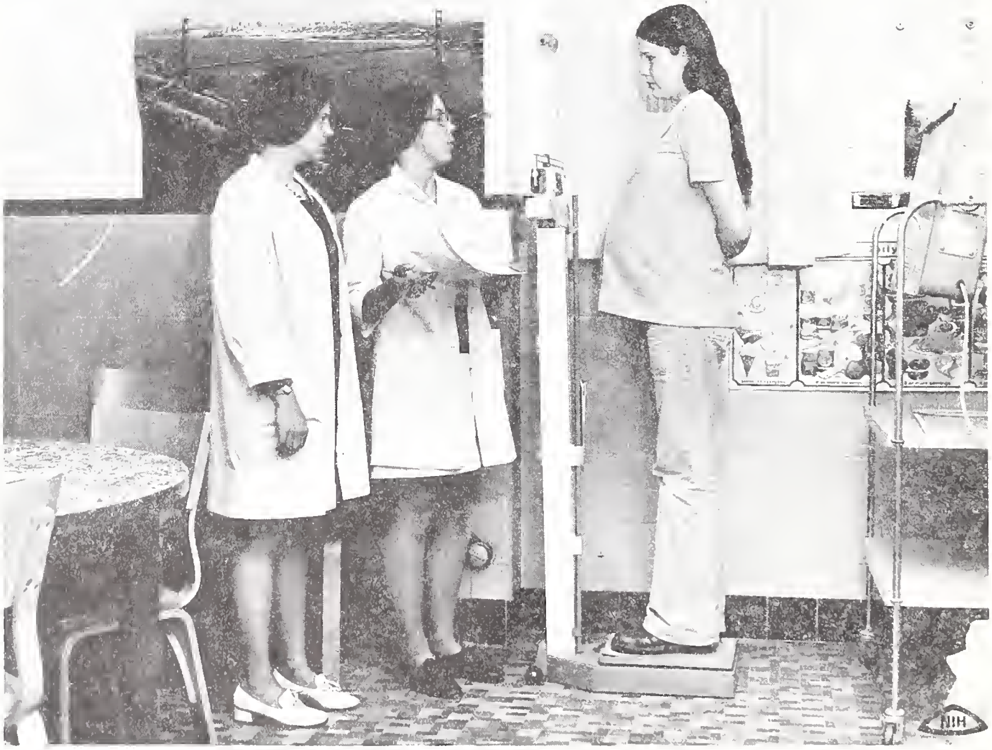


GALVESTON, TX--Pediatric Nurse Practitioners at The University of Texas Medical Branch receiving information for a young patient's medical history from the child's mother. Nurse Practitioners are (from left) Joyce Rader, Hilda Kolva, and Clara Milko. The Pediatric Nurse Practitioner Program is supported by a training contract from the Divi of Nursing of the National Institutes of Health. (NIH Photo #N-15)

IANAPOLIS, IN--The Pediatric Nurse Practitioner program at the Methodist Hospital Indiana is funded by a National Institutes of Health training contract administered the Division of Nursing. In the upper photo, Dr. Lorraine Kelly (center) observes registered nurses examine a nine-year-old boy (release obtained). In the lower to, Dr. Gabriel J. Rosenberg (second from left) instructs registered nurses on examination of a well baby. (NIH Photo #N-16 and #N-17)

PHOENIX, AR--The Pediatric Nurse Practitioner program at Good Samaritan Hospital is supported by a training contract from the Division of Nursing of the National Institutes of Health. Registered nurses in the program learn how to care for newborns (upper photo, release obtained) and hospitalized youngsters (lower photo, release obtained). (NIH Photo #N-18 and #N-19)

ESTER, NY--Registered Nurses are being trained at the University of Rochester to be
cal nurse practitioners. The training is funded by a contract awarded by the Division
ursing of the National Institutes of Health. Project directors are Barbara Bates, M.D.,
Miss Joan Lynaugh. The nurses take patient histories (upper photo) and do chest
inations (lower photo). (NIH Photo #N-20 and #N-21)



SAN FRANCISCO, CA--The Division of Nursing of the National Institutes of Health has awarded a contract to the University of California, San Francisco, for training Pediatric and Maternal Nurse Practitioners. In the upper photo, Dr. Philip Goldstein (left) instructs Doris Weyl, R.N. (center) on the proper way to listen to a fetal heart beat (release obtained). Also shown is Rosemary Mann, R.N., of the nursing faculty. In the lower photo, a maternity patient (release obtained) is weighed-in by Rosemary Mann, R.N., and Doris Weyl, R.N. (NIH Photo #N-22 and #N-23)

NEWS&FEATURES FROM NIH

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE ■ Public Health Service ■ National Institutes of Health ■ Office of Information ■ Bethesda, Maryland 20014

November 25, 1972

SPECIAL SUPPLEMENT:
NIH Portfolio on Sickle Cell Disease Centers

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Phone: (301) 496-1206

NEWS & FEATURES From NIH November 25, 1972

Research Advances

SCIENTISTS STUDY SURVIVAL RATES FOR SMOKERS WITH LUNG CANCER

Many studies have indicated a causative relationship between cigarette smoking and lung cancer. The relationship, however, poses questions regarding cancer deaths. For example, among lung cancer patients, is survival better for non-cigarette smokers than for smokers? Is the length of survival related to the number of cigarettes smoked?

In a Federally-supported study designed to answer these questions, investigators at the California State Department of Health found no significant differences in the survival rates among lung cancer patients grouped according to the number of cigarettes smoked daily. They found that the stage of the disease at diagnosis, rather than the smoking category, was the important factor in length of survival.

Working under a research contract from the End Results Section of the National Cancer Institute Biometry Branch, the scientists studied a group of 460 male patients with lung cancer. Sources of data for the investigation included a study on occupational history and lung cancer; a survey of the relationship between residence and lung cancer; and data from the California Tumor Registry reported by 57 hospitals in the state.

To avoid bias, the investigators excluded from the study cases where lung cancer was diagnosed prior to the completion of the health questionnaires, cases where the smoking history was unknown, and 20 female patients. Since women are lighter smokers than men and because women with lung cancer have higher survival rates than their male counterparts, the investigators

(more)

felt that inclusion of this small number of female cases would raise the survival rates of the total group of light smokers and add a complicating factor to the study.

In the group of 460 cases, only 15 were nonsmokers while the large majority (51%) smoked one pack a day.

Because of the rapid depletion of the study population from deaths, the NCI investigators computed net survival rates for 3-month intervals instead of yearly intervals. (Net survival rates represent the probability of surviving death from lung cancer with all other risks eliminated.) As a result, they found that survival patterns for smokers of one-half, one, and one-and-a-half packs a day were very similar. Nonsmokers had the highest survival rate at the end of the first three months, but the lowest thereafter. Two plus packs-a-day smokers, on the other hand, appeared to have a slightly better survival rate.

By way of explanation for this finding, the investigators indicate that the heavy smokers had the highest percentage of localized disease as well as the highest percentage of squamous cell carcinomas. (Squamous cell carcinomas derive from cells forming the lining of the bronchial tree.) Both of these conditions are correlated with a higher rate of survival.

Heavy smokers, the investigators report, had the highest proportion of localized disease (that is, disease still confined to the lung) when compared with nonsmokers and smokers of less than two packs a day. When the scientists computed net survival rates by smoking categories for localized cases, they found that heavy smokers again showed higher survival rates, even

(more)

though the numbers were small and the rates statistically unreliable. In contrast, survival rates for the cases that were nonlocalized showed no differences among the categories.

Heavy smokers had the highest rate of squamous cell carcinomas and this was associated with a better survival experience during the first year. However, this difference diminished gradually and then disappeared. The investigators indicate that squamous cell carcinomas of the lung are generally diagnosed in an earlier stage of disease and this may explain the survival difference.

The findings from the present study are consistent with those from previous studies which indicated that squamous cell carcinomas have a rapid growth rate and moderate metastatic potential. Adenocarcinomas, on the other hand, grow slowly but have a high metastatic potential. (This type of carcinoma derives from mucus-secreting cells.)

The investigators assumed that the potential for a cancer to spread throughout the body is related to stage at diagnosis. This may explain why heavy smokers, with the highest proportion of squamous cell cancers, show a larger proportion of localized cases and apparently better survival.

Another possibility is that respiratory problems caused heavy smokers to seek medical help earlier and therefore led to earlier diagnosis of lung cancer.

(more)

Smokers (Cont'd)

The investigators note that these survival rates are categorized according to smoking history prior to the diagnosis. No data are available to indicate whether the patient discontinued smoking after the malignancy was discovered.

George Linden, John E. Dunn, Jr., Patsy H. Hom, and Marina Mann report their findings in the August 1972 issue of *Cancer*.

#

Research Advances

STUDY SHEDS LIGHT ON CAUSE OF DIARRHEA IN CHOLERA

To shed some light on the disturbance in sodium ion transport which causes diarrhea in cholera, scientists studied cholera victims during a recent epidemic in Bangladesh. The study was carried out on 14 adult patients at the Cholera Research Laboratory, Dacca. The laboratory is sponsored by NIH and the Agency for International Development. The NIH function is administered by the National Institute of Allergy and Infectious Diseases (NIAID).

The massive loss of fluids and electrolytes from the intestine in cholera victims can lead to death within hours. Normally, there is a large flow of water and electrolytes--such as sodium chloride--from blood plasma into the intestinal lumen (interior) and a slightly larger flow of water and electrolytes from the intestine back into the plasma. In cholera, there is a net loss of electrolytes from the plasma, but scientists have not clearly understood whether the loss is due to an increased flow of electrolytes from plasma into the intestine, a decreased flow of electrolytes from the intestine into plasma, or a combination of the two.

Using isotope-labeled sodium, the NIAID-supported investigators measured bi-directional sodium ion transport (from lumen to plasma and from plasma to lumen) in the patients. Each patient served as his own control, since he was investigated both during acute diarrheal illness and in early convalescence after diarrhea had stopped.

(more)

The investigators found that diarrhea in the acute stages of cholera is associated with a striking reduction in the flow of electrolytes in both directions. However, the lumen to plasma flow was reduced more than the flow from plasma to lumen, leading to an accumulation of sodium ions within the intestine. Net sodium movement was very small compared to large bidirectional flows.

The present findings indicate that small changes in the flow of electrolytes in either direction may lead to a profound imbalance and consequently large alterations in net transport. The disturbances in sodium ion transport measured by the investigators may not be unique to cholera and may explain the pathogenesis of diarrhea in other diseases.

The investigators plan further studies of possible disorders of mucous membrane cell function that might produce the changes in ion transfer described in the present studies.

Drs. A.H.G. Love, R.A. Phillips, J.E. Rhode, and N. Veall report their findings in *Lancet*, July 22, 1972.

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NEWS & FEATURES From NIH November 25, 1972

Research Advances

SEATTLE INVESTIGATORS REPORT ADVANCES IN ORTHODONTIC PLANNING

Orthodontists supported by the National Institute of Dental Research report that the distance between canine teeth in the lower jaw is a better frame of reference for planning orthodontic treatment than the time-worn Pont's Index. (Pont's Index keys the ideally-shaped dentition to the width of the four upper front teeth.)

The investigators at the University of Seattle, Washington, compared measurements of dental casts made before orthodontic treatment, at the completion of treatment, and ten years after patients ceased to wear retaining appliances. They found that the original shape of the lower dental arch and the width between the lower canine teeth correlated much better with the final positions of adult teeth than the traditional Pont's Index.

The investigators believe that permanent increases in lower arch width seldom occur. Their findings held equally for 20 patients who were treated by extraction and for 52 others treated by extraction as well as tension appliances. In most cases, the lower dental arch returned close to its original form and influenced the shape of the upper dental arch. Pont's Index assumed that the upper jaw controls the eventual shape of the lower jaw.

Based on their study, Drs. Donald R. Joondeph, Alton W. Moore, and Richard A. Riedel recommend that treatment planning for malocclusion and prediction of results should be based on the width and shape of the lower arch. A complete report of their work appeared in the August 1972 *Journal of the American Dental Association.*

#

Research Advances

IN THE LITERATURE:
Pediatrics, February 1972

HIGH PROTEIN DIETS IN LOW BIRTHWEIGHT INFANTS MAY HAVE ADVERSE NEUROLOGICAL EFFECTS--High protein diets which are fed to premature infants to advance their growth rate may in certain babies lead to neurological defects and impaired intellectual function by the time the children are school age.

This finding results from a study conducted by National Institute of Neurological Diseases and Stroke grantees at UCLA, Johns Hopkins University, and the University of California, at Riverside.

Interestingly, the grantees found that the correlation between high protein diet and neurological problems occurred only in premature infants weighing 2000 grams or more, and not in those weighing less.

The problems stem from the infants' inability to metabolize the amino acid tyrosine, one of 21 major amino acids which bind together to make a protein.

Although the scientists do not recommend terminating high-protein diets for these infants, they do suggest minimizing the adverse effects by one of two methods--either reducing the percent of protein in the formula (thereby reducing the amount of tyrosine) or by adding a reducing agent, such as ascorbic acid, to the formula.

Dramatically low tyrosine levels characteristic of low birthweight premature infants led the investigators to study its possible adverse neurological effects. Of the 71 premature children in the study who had been fed a high protein formula, 89 percent had high tyrosine levels in early life.

(more)

Those same children tested at 2 years of age were not found to differ in their neurologic status from children born with lower tyrosine levels. However, when tested at 7 or 8 years of age, those with high tyrosine levels in infancy were found to have disturbances of visual motor function, abstraction, and speech.

The investigators speculate that the high protein formula in vogue during the past decade for premature infants may be one of the causative factors responsible for the increased number of children with "minimal cerebral damage," perceptual problems, and learning disorders currently encountered in many school age children.

A report of this study was published by John H. Menkes, Doris W. Welcher, Helene S. Levi, Joseph Dallas, and Neil E. Gretsky.

#

NEWS & FEATURES From NIH November 25, 1972

Photo Feature

NIH-Developed...

ARTIFICIAL CIRCULATORY NETWORK GROWS CELLS TO NATURAL DENSITY

NIH scientists have devised an artificial circulatory network that allows them to grow living animal cells in the laboratory to a density that resembles natural body tissue.

With current methods, many types of human and animal cells can be grown in a test tube, but they stop growing at concentrations much lower than their normal density in body tissues. Scientists believe this to be due in part to a lack of the continuous nourishment and cleansing action provided by the capillaries or tiny blood vessels that permeate normal tissues. Under test-tube conditions, cells function quite differently than they do in normal tissue, where the cells are in contact with each other and influence each other's activities.

The NIH scientists--Richard A. Knazek, M.D. and Pietro M. Gullino, M.D., of the National Cancer Institute (NCI), Peter O. Kohler, M.D. of the National Institute of Child Health and Human Development, and Robert L. Dedrick, Ph.D., of the Division of Research Services--have simulated the conditions of living tissue. They have grown cells inside a glass shell fitted with a bundle of tiny tubes through which a nutrient fluid (comparable with blood) is pumped. The cells grow over the surface of the tubes and in the spaces between them. Like blood vessels, the tubes are porous enough to allow oxygen and fresh nutrients to pass through the walls to the cells and cellular waste products.

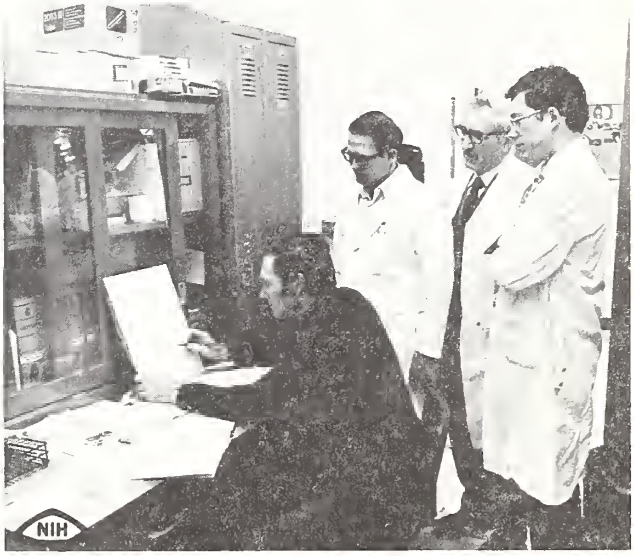
(more)

Drs. Knazek and Gullino plan to use the new technique in their research on cancer. By altering hormones and other ingredients in the nutrient fluid, they will study the conditions that promote or inhibit the growth of various kinds of cancer tissue.

The artificial capillary network not only affords good conditions for growing cells to tissue-like density, but is also an efficient way of collecting cell products. For instance, hormones produced by cells can be isolated from the fluids in which they are grown. Drs. Knazek and Gullino believe that such artificial tissues might serve as living factories for the production of human hormones, now very difficult to obtain but necessary in the treatment of some diseases.

This technique may also offer a new tool for the study of the effect of one type of cell on another. This effect might be studied by growing each cell type in separate systems but allowing the nutrient fluid to flow directly from one unit to the other.

An application for a patent for the device has been registered by NIH in the names of Drs. Knazek, Gullino, Dedrick, and of William R. Kidwell, Ph.D., NCI. Under Federal patent policy, rights to the device



Four NIH scientists evaluate the cell-produced hormones that can be isolated from the medium via a new artificial circulatory network. Robert L. Dedrick, Ph.D. (seated), is holding a chart while William R. Kidwell, Ph.D. (left), Pietro M. Gullino, M.D. (center), and Richard A. Knazek, M.D., look on. Drs. Kidwell, Gullino, and Knazek are with the National Cancer Institute. Dr. Dedrick works in the Division of Research Services. They collaborated with Peter O. Kohler, M.D., of the National Institute of Child Health and Human Development. (NIH Photo #974)

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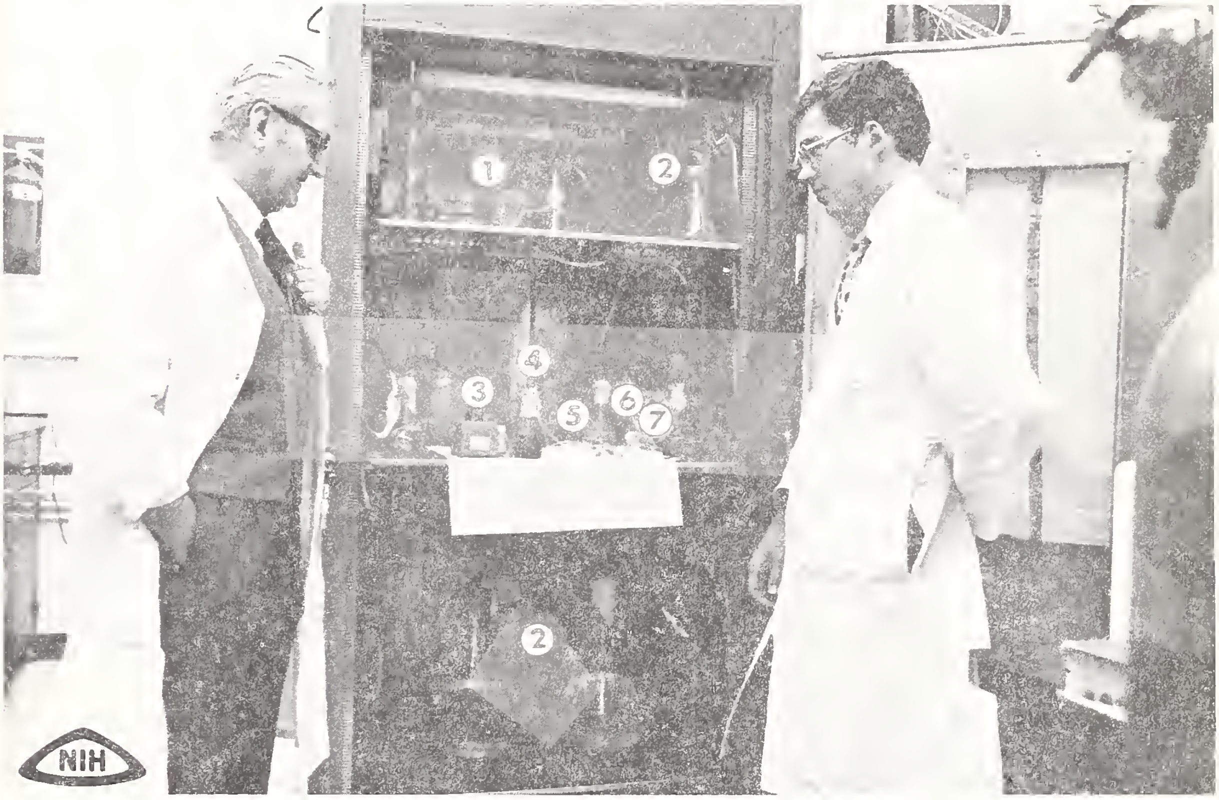
will remain in the public domain.

The scientists published a report of their achievement in the October 6, 1972 issue of *Science*.



This artificial circulatory network allows NIH scientists to grow living cells to a density of 100 million cells per cc--similar to the density of natural body tissues. The network includes a CO_2 control (1), several humidifiers (2), roller pump (3), reservoir of cell nutrients (4), oxygenator (5), cell culture unit (6), and inoculation syringe (7). Shown checking the network are Pietro M. Gullino, M.D. (left), and Richard A. Knazek, M.D., of the National Cancer Institute. (NIH Photo # 975)

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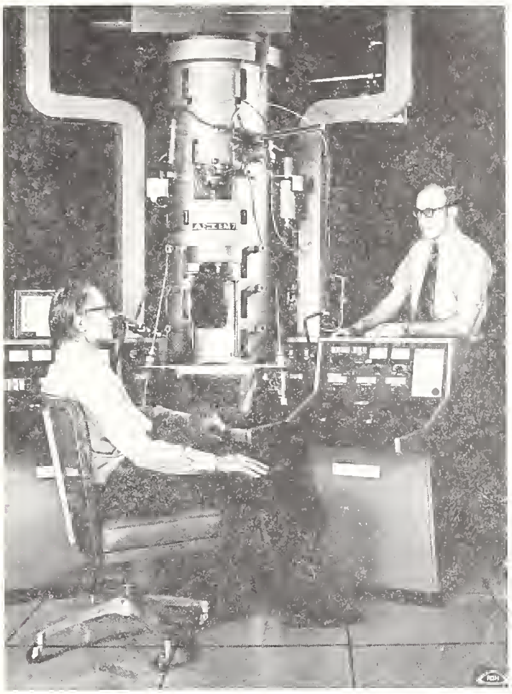
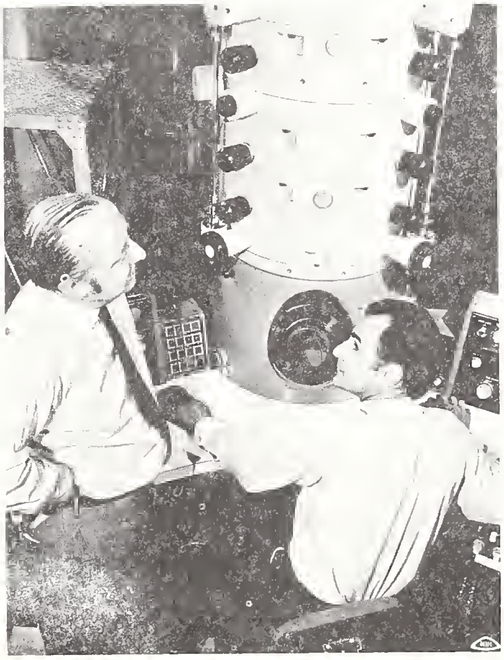
Photo Feature

Exclusively for Biomedical Research...

TWO NEW ELECTRON MICROSCOPES FACILITATE STUDY OF HUMAN CELLS



The first one-million volt electron microscope in the world devoted exclusively to biomedical research has been put into operation at the University of Wisconsin. Cell biologist Dr. Hans Ris (seated), program director for the new facility, hopes to use the powerful microscope to unravel the mystery of the inner workings of chromosomes and solve the chemistry of genetics. Dr. Dale Johnson (standing), physicist in charge, will concentrate on the problem of radiation damage to specimens subjected to the massive electron flow in the vacuum of the column. The new microscope, capable of magnifying 1,000,000 times, will produce three-dimensional cell specimen photos never before routinely obtained in the United States. The facility is supported by the NIH Division of Research Resources (DRR). (NIH Photo #976)



A second million volt electron microscope facility devoted solely to biomedical research will soon be put into operation at Boulder, Colorado. Here, Dr. Keith R. Porter, chairman of the Department of Molecular, Cellular, and Developmental Biology at the University of Colorado, surveys the column of the electron microscope. The new electron microscope will allow greater cell specimen penetration and greater image resolution in photos. Dr. Mircea Fotino, resource director, operates the controls of the microscope. Both of the new facilities are supported by grants totalling $1.7 million from DRR. (NIH Photo #977)

#

November 25, 1972

Photo Feature

MONKEYS FED AVERAGE AMERICAN DIET SUFFER HEART AND ARTERY DAMAGE

Monkeys fed an average American diet suffer three times as much atherosclerotic damage to their aortas as monkeys fed a "sensible" diet. Similar injuries in man would increase the likelihood of heart attacks.

This is the finding of Dr. Robert W. Wissler at the University of Chicago, which is a recent recipient of a Specialized Center of Research grant funded by the National Heart and Lung Institute. This Center will focus on the study of lipoproteins and their interaction with the artery wall in the development of atherosclerosis.

Dr. Wissler, a Professor of Pathology at the University, fed 11 Rhesus monkeys either a "typical" American diet or a prudent diet. The prudent diet contained less roast beef and roast pork but more fish, baked chicken, and turkey than the typical diet. It also omitted eggs and pound cake, while substituting cottage cheese for American cheese and unsaturated margarine and corn oil for butter.

The American diet contained real butter, lard, and margarine with abundant saturated fats and cholesterol derived from meat and eggs. Both were prepared as if for human consumption.

When he measured cholesterol levels in the blood of the monkeys, Dr. Wissler found that the 11 monkeys on the prudent diet had 199 milligrams per 100 milliliters, while monkeys on the American diet averaged 383 milligrams per 100 milliliters--nearly twice as much.

(more)

He also measured the extent of fatty deposits in the aortas of monkeys fed a given diet for two years. Aortic lesions (plaques) in animals on the typical American diet covered an area almost seven times greater than lesions in the animals on the prudent diet. The American diet produced lesions covering 46 percent of the inner surface of the aorta while the prudent diet produced lesions over only seven percent of the aorta, according to Dr. Wissler.

The study also indicated that the fatty plaques from the average American diet were four times more severe. Pathologists evaluated the aortic lesions in each animal and assigned a number from one to four according to their severity--the more severe the lesion, the higher the number. The total of "severity numbers" in the 11 animals on the prudent diet was five. For the animals on the American diet, it was 21.

A parallel part of Dr. Wissler's study evaluated frequency and severity of lesions in the coronary arteries of the two groups. Animals fed the American diet had more than four times as many coronary lesions as the other group of animals--27 lesions compared to six lesions. The lesions were found to be four times as severe in the animals on the American diet--the "severity total" was nine for the typical diet and two for the prudent diet.

These studies are significant, Dr. Wissler said, because they provide the first experimental data correlating the table-prepared average American diet with the types of lesions that greatly increase the likelihood of heart attacks.

"These studies also provide direct data to support the theory that a rational diet...can be a potent tool to prevent atherosclerosis and heart attack," Dr. Wissler said.

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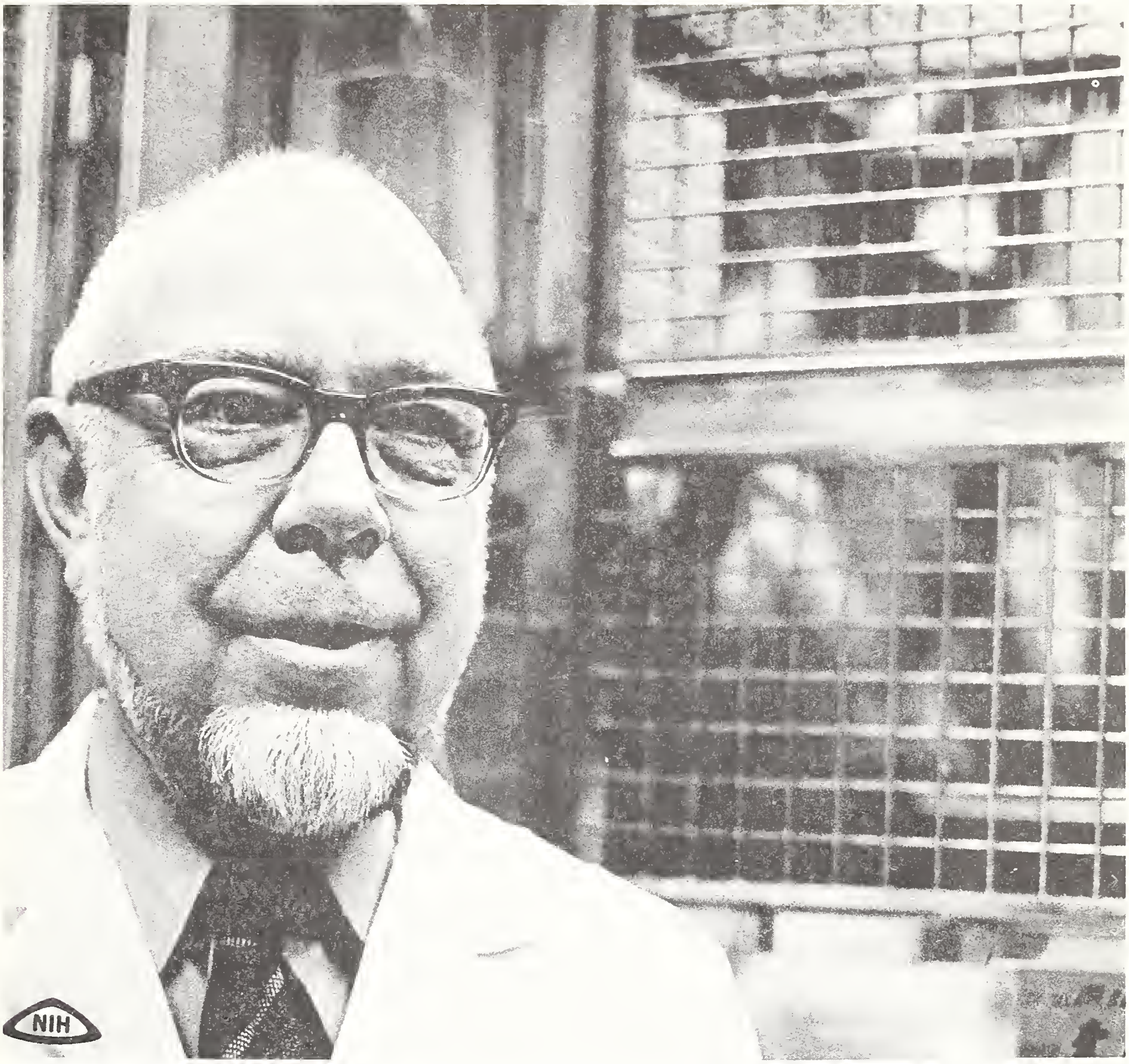
Average American Diet (Cont'd)



Dr. Robert W. Wissler (above) fed 11 Rhesus monkeys typical American diets over a two-year period. These monkeys developed higher cholesterol levels in their blood, as well as more frequent and more severe aortic lesions and coronary lesions than did monkeys fed a more prudent diet. Dr. Wissler, the Donald N. Pritzker Professor, Department of Pathology at the University of Chicago, is a grantee of the National Heart and Lung Institute. (NIH Photo #978)

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Medical News Tip

IMPROVING THE DIAGNOSIS AND TREATMENT OF STROKES--The immediate cause of stroke (cerebrovascular disease) can be explained simply as an obstruction of the blood flow to the brain. However, the condition presents an extremely complex set of medical, scientific, and technical problems.

Through a National Institute of Neurological Diseases and Stroke (NINDS) program of stroke research, scientists from many disciplines are working to understand the way the brain cells receive nutrition, the dynamics of blood flow in the brain, the effect of drugs, and many other processes.

NINDS grantees are devoting substantial effort to the improvement of the diagnosis of strokes. There are presently a number of methods for detecting and locating circulatory defects in the brain, but even the best of these methods is not entirely satisfactory. Scientists are now searching for new diagnostic techniques for screening populations as well as new methods for diagnosing stroke victims.

Institute-supported scientists are also making steady progress in therapy for cerebrovascular disease, both in the area of surgery and drug therapy. The institute is also attempting to collect reliable data to aid in better treatment and in research and program planning. This is accomplished through support of several large scale epidemiological studies.

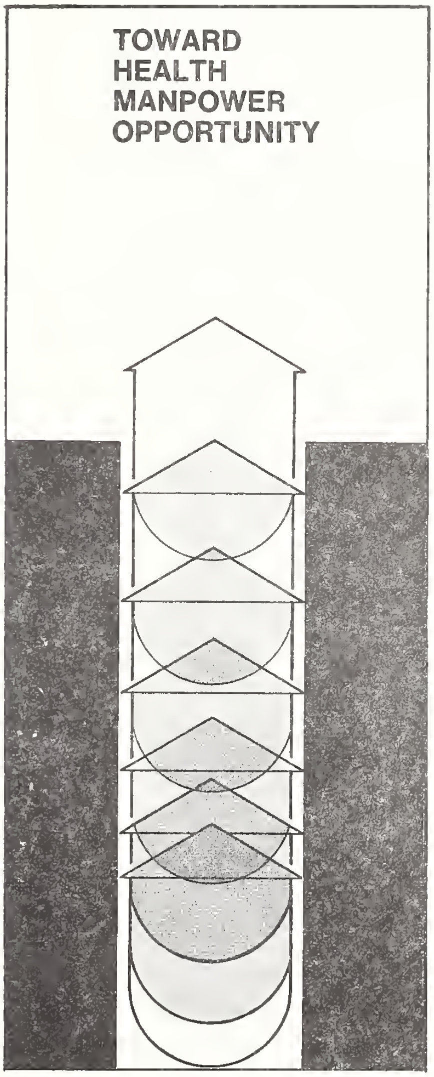
For additional information about the program of stroke research at NINDS, contact:

NINDS Information Office
Bldg. 31, Room 8A-03
NIH, Bethesda, MD 20014
Phone: (301) 496-5751

#

New Publication:
Toward Health Manpower Opportunity

Black Americans, Spanish-surnamed Americans, American Indians, and women are grossly underrepresented in the health professions. This scarcity of minority health professionals is linked with the uneven distribution of health personnel throughout the country. Hardest hit by this uneven distribution are people living in less attractive inner-city and rural areas.



Toward Health Manpower Opportunity, a new publication from the NIH Bureau of Health Manpower Education (BHME), describes efforts to increase the number of minority group members in medical schools and, ultimately, in professional careers. The booklet also provides information on financial support available for these minority candidates.

Under the Health Manpower Education Initiative Awards program, special Health Career Opportunity grants are authorized to recruit disadvantaged students--especially from minorities and students likely to practice in underserved areas--into the health professions and other health fields. These grants are also awarded for projects to identify and enroll these individuals in professional schools.

For a copy of this booklet, contact: Information Office, BHME, Building 31, Room 5B-63, NIH, Bethesda, MD 20014; phone (301) 496-6011.

#

News Releases Issued

(Summaries of NIH releases sent out since the last issue. For a copy of any of these, please write or call.)

GENETIC COUNSELING--A three-year study of social, legal, and ethical aspects of genetic counseling and of screening for carriers of inherited diseases will be performed by the Institute of Society, Ethics and the Life Sciences at Hastings-on-Hudson, New York. The work is supported by a grant from the National Institute of General Medical Sciences. The general issues to be examined include those of privacy, confidentiality, informed consent, and freedom from coercion in genetic counseling and genetic screening. The study group to be assembled will include geneticists, lawyers, sociologists, and theologians. This will permit a wide variety of information--medical, legal, sociological, and cultural--to be gathered during the multi-faceted study. The Hastings group is not expected to define or recommend ultimate policies as a result of this study.

CANCER RESEARCH IN ISRAEL--A multi-disciplinary cancer research program will be established at the Weizmann Institute of Science in Rehovot, Israel, under a $447,000 research contract from the National Cancer Institute. Several research topics will be investigated, including the roles of various white blood cell populations in the body's defense against cancer, and methods that may induce leukemia cells to mature normally. Attempts will also be made to further develop tests that offer hope for early cancer detection and diagnosis.

News Releases Issued (Cont'd)

NIAID ACADEMIC AWARDS--The National Institute of Allergy and Infectious Diseases (NIAID) has established an Allergic Diseases Academic Award program. The new program supplements existing awards in the areas of research, research training, fellowships, and career development. Individuals holding health professional degrees in the clinical sciences with a total of five to 10 years of professional postdoctoral experience in pertinent areas are eligible for the awards. The candidates, who must be under 40 at the time of application --should have demonstrated competence in the areas of clinical care and research. Each candidate must be nominated by a school of medicine or osteopathy in the United States or its possessions and territories. The award will provide salary support for a five-year period in the maximum amount of $25,000 per year.

For additional information contact:

Allergic Diseases Academic Award Program
Extramural Programs
NIAID
Westwood Building, Room 703
Bethesda, MD 20016

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NEWS & FEATURES From NIH
National Institutes of Health
Building 31, Room 2B-10
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December 10, 1972

SPECIAL SUPPLEMENT:
NIH Portfolio on Minority Schools Biomedical Support

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There will be no December 25 issue of NEWS & FEATURES From NIH. Publication will resume on our usual twice-monthly schedule with the issue dated January 10. Best wishes for the holiday season and the coming New Year.

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Phone: (301) 496-1206

NEWS & FEATURES From NIH December 10, 1972

Research Advances

STUDY REPORTS VASECTOMY GAINING IN POPULARITY

A survey conducted for the Center for Population Research of the National Institute of Child Health and Human Development (NICHD) has revealed that vasectomy is becoming increasingly popular as a means of birth control.

This study, directed by Duff G. Gillespie, Ph.D. and William H. Spillane, Ph.D., of NICHD, represents the first attempt on a national scale to conduct a survey dealing with knowledge and attitudes toward vasectomy. Most behavioral science studies thus far have dealt with the potential psychosocial pathology which may develop as a result of the procedure.

For the study, the Opinion Research Corporation, Princeton, New Jersey, interviewed 2,003 male and female adults, 18 years of age or older. The respondents represented varying economic, religious, and age groups.

Each subject received a 44-item questionnaire to complete. The questionnaire contained a series of eight true-false questions on the nature of vasectomy, its legality, cost and popularity, and the sterilized man's satisfaction with the procedure. A total of 73 percent of the subjects (1,438) completed the questions on vasectomy.

Answers to the questions revealed an unanticipated high degree of knowledge on the part of participants regarding vasectomy, with the exception of one subject: Every group was least knowledgeable about the irreversibility of vasectomy.

Although current medical opinion supports the contention that vasectomy be considered essentially permanent, the investigators found that 18 percent

(more)

of those respondents who said that either they or their spouse had a vasectomy believed that the operation was easy to reverse. Furthermore, 27 percent of those who were considering having a vasectomy indicated that they thought the procedure could be easily reversed.

Except for the reversibility item, males had a slightly higher proportion of correct answers than did females. Also more knowledgeable about vasectomy were Protestants, married respondents, and residents of the West. When they considered the respondents by age groups, the investigators found that persons in the 30-44 years old age category were the most knowledgeable. Knowledge of vasectomy correlated positively with increasing education and income.

The fact that persons have a high degree of knowledge about a particular method of birth control does not necessarily mean they will have positive attitudes toward that method. In the case of vasectomy, however, high knowledge was matched with positive attitudes, regardless of the reason for seeking the operation.

Those individuals displaying a good knowledge of vasectomy overwhelmingly approved the procedure, whether done for health reasons or solely to limit family size. On the other hand, slightly more than one-half of those individuals with less information at their disposal tended to approve vasectomy only if performed for health reasons.

In view of their findings about public knowledge of vasectomy, which indicate that it will continue to be an increasingly popular means of permanent birth control, Drs. Gillespie and Spillane strongly suggest that medical and

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allied health professionals make certain that persons seeking a vasectomy fully understand the essentially irreversible nature of the procedure.

The investigators reported their findings at the meeting of the American Public Health Association, November 15, 1972.

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NEWS & FEATURES From NIH December 10, 1972

Research Advances

SCIENTISTS FIND NEW CLUES TO SPREAD OF TOXOPLASMOSIS

Cockroaches and wild cats may join the domestic cat and other animals as carriers of toxoplasmosis, a widespread parasitic infection found throughout the world. Scientists at the National Institute of Allergy and Infectious Diseases (NIAID) and investigators supported by the Institute report new evidence implicating these species in the transmission of the toxo organism.

Although usually a mild disease, toxoplasmosis can be extremely serious in pregnant women who contract it. Like German measles, toxoplasmosis may cause congenital defects in an unborn child, while causing a mild or symptomless disease in the mother. More than one-third of all adult Americans are infected by the toxo organism at some time during their lives.

Despite the prevalence of toxoplasmosis, its modes of transmission are still not well understood. Scientists know that many seemingly well animals harbor the parasite in the form of cysts in their tissues and organs. The parasite lives in raw red meat after slaughter and people apparently can acquire toxo by eating raw or undercooked meat infected with cysts.

Recently studies have indicated that domestic cats may be a major reservoir for human infections. Cats consume birds or rodents carrying the parasite, resulting in the growth and multiplication of the parasites within the cat's intestine. The cat then excretes the parasites in the form of small, sac-like capsules called oocysts. Filth flies, one to two days after eating infected cat feces, have been found capable of transmitting infectious toxoplasma oocysts to human food.

(more)

Now, Dr. G.D. Wallace of NIAID's Pacific Research Unit has discovered that two common species of cockroaches are capable of harboring and shedding infectious oocysts for several days under laboratory conditions. In Dr. Wallace's experiments, Madeira and American cockroaches were starved and then allowed access to cat feces containing infectious toxoplasma oocysts. He tested roach feces and digestive tracts for infectivity in mice. Toxoplasma was isolated from the cockroach's digestive tract as long as seven days and from cockroach feces as long as nine to 10 days after cockroaches had last been in contact with cat feces.

In nature, it is possible that cockroaches might eat infectious cat feces and, in turn, contaminate human food. Cockroaches and filth flies might also play a role in the life cycle of toxoplasma by serving as s source of infection for birds and small wild rodents. Such animals, normally the prey of cats, are found naturally infected with toxoplasma and are potential intermediate hosts of the parasite.

In another study, University of Kansas scientists, supported in part by NIAID, found that not only domestic cats, but other members of the cat family can spread toxoplasma parasites through oocysts in their feces. The studies were carried out in collaboration with investigators at the Middle America Research Unit and the U.S. Army Medical Research Unit in the Panama Canal Zone and in Costa Rica. Scientists fed mice infected with toxoplasma cysts to several wild animals from the Felidae (cat) and Procyonidae (racoon) families. The investigators isolated the toxoplasma parasite from the feces of one jaguarundi and two ocelots in the study.

(more)

Toxoplasmosis (Cont'd)

These findings explain the reported occurrence of toxoplasmosis in non-meat eating animals in regions where domestic cats do not exist. Jaguarundis, ocelots, and possibly other wild felines could serve as the primary host for the parasite in the jungle, where house cats are rare or absent.

These current developments on toxoplasmosis were reported by G.D. Wallace in the November 1972 issue of *Journal of Infectious Diseases* and by M.L. Jewell, J.K. Frenkel, K.M. Johnson, V. Reed, and A. Ruiz in the September 1972 issue of *American Journal of Tropical Medicine and Hygiene.*

#

Research Advances

SEX ATTRACTANT MAY LEAD TO DEMISE OF DISEASE-BEARING TICKS

Control of certain tick-borne diseases may be closer to reality as the result of work supported by the National Institute of Allergy and Infectious Diseases.

Dr. R.S. Berger at Auburn University, Alabama, has taken the first step in this direction by identifying the chemical structure of the sex attractant of the female lone star tick, *Amblyomma americanum*. This species carries several organisms which cause disease in animals and in man, notably Q fever and tularemia.

Potentially, insect sex attractants--or pheromones--can be used to attract male insects, which can then be destroyed. Such a selective biological means of controlling insect population, and hence the spread of insect-borne disease, is preferable to widespread spraying of chemical insecticides, which frequently harm animals and plants other than those for which they are intended.

To obtain sufficient quantities of the sex pheromone of *Amblyomma americanum* for analysis, Dr. Berger used about 50,000 adult female ticks. The compound does not occur in the blood of the host (man or any other animal) on which the tick may feed. Only trace amounts are found in male ticks.

(more)

Disease-Bearing Ticks (Cont'd)

Dr. Berger identified the pheromone as 2,6-dichlorophenol. This is the first example of a chlorinated organic compound occurring as a natural product in a land animal. However, chlorinated industrial and agricultural chemicals are widely distributed in the environment. Special experiments were carried out to make certain that the tick did not acquire the compound from environmental exposure or as a result of breakdown from a larger substance. Synthetic 2,6-dichlorophenol also elicited behavioral responses in male ticks similar to those observed following exposure to the female pheromone extract.

Dr. Berger plans further studies to determine the minimum quantity of female sex pheromone that can be used to attract male ticks. Through this research he also hopes to obtain other information that might be used to develop means of biologically controlling the tick population and thus preventing the spread of tick-borne disease. For example, 2,6-dichlorophenol--either synthetic or naturally occurring--could be applied directly to the host. Or, since the sex attractant causes male ticks to simulate copulation, the pheromone could be used to fatigue or confuse the male to the extent that he would be unable to mate with a female tick.

Dr. Berger reported his work in the August 25, 1972 issue of *Science*.

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NEWS & FEATURES From NIH December 10, 1972

News Feature

French Prize Winners...

SCIENTISTS DEVELOP FROG NUCLEI TRANSPLANT METHOD

NOTE TO SCIENCE WRITERS:

NIH administrator/scientist Thomas J. King, Ph.D., and National Institute of General Medical Sciences grantee Robert W. Briggs, Ph.D., recently won the highest biology prize of the Academy of Sciences, Institute of France. They share the Charles-Leopold Mayer Prize for their collaborative achievements in the transplantation of cell nuclei. Their technique involves delicate microsurgery on amphibian eggs and embryos.

Dr. King, Program Director of the National Bladder and Prostate Cancer Programs of the National Cancer Institute, and Dr. Briggs, Research Professor and Chairman of the Zoology Department at the University of Indiana, Bloomington, have worked together in NIH-funded research for more than 20 years.

Recently, NEWS & FEATURES From NIH *interviewed Dr. King to gain some insight into his important research project and microsurgery technique.*

(more)

Dr. Briggs

Dr. King

Question: Dr. King, what were you and Dr. Briggs seeking in your research?

Dr. King: We wanted to find out which of the two major components of a cell --the nucleus or its surrounding cytoplasm--determines the differentiated state of the cell. We demonstrated that it is technically possible to transplant living nuclei of amphibian (frog) cells in an undamaged condition. Our initial experiments showed that nuclei of blastulae and early gastrulae are capable of promoting complete and normal development--i.e., they are "undifferentiated" and are equivalent to the zygote nucleus at the beginning of development.

Question: Why did you choose the frog?

Dr. King: Because of the wealth of background information on amphibian egg and embryos, the relatively large egg size, and because of the considerable data available as to their normal development.

Question: What is your microsurgery technique?

Dr. King: We activate a recently ovulated frog egg by pricking it with a clean glass needle, and then remove the egg nucleus with a second glass needle.

Question: Isn't that a very delicate procedure?

Dr. King: Yes, it is. A single donor cell, gently drawn into the tip of a micropipette, must be compressed and distorted in such a way as to break the cell surface without dispersing the cytoplasm in the immediate vicinity of the donor cell nucleus. This part

(more)

of the procedure is quite difficult to do without diluting the cytoplasm with the injection medium, thereby damaging or killing the nucleus. However, when properly done, the transplant nucleus can be seen near the center of the broken cell and transplanted into the center of the previously-prepared activated and enucleated host egg. The donor nucleus is liberated into the egg cytoplasm by carefully injecting it into the center of the host egg with a minimal amount of pressure.

Question: What did you observe?

Dr. King: One finding was that nuclei of advanced cell types have a decreasing ability to promote normal development of the test eggs.

Question: What are the implications of your findings?

Dr. King: We can study the developmental capacity of nuclei from differentiated cell types. The nuclei of such cells may not be differentiated per se but may be in a phase of the cell cycle that does not permit them to accomodate to their new cytoplasmic environment, namely the egg cytoplasm. Initial attempts to extend this work to amphibian tumors such as the LUCKÉ renal adenocarcinoma have shown that nuclei of cancer cells can, in union with the egg cytoplasm, repeat the early events of embryonic development. Since this is a virus-associated tumor, much more meaningful experiments are waiting to be done.

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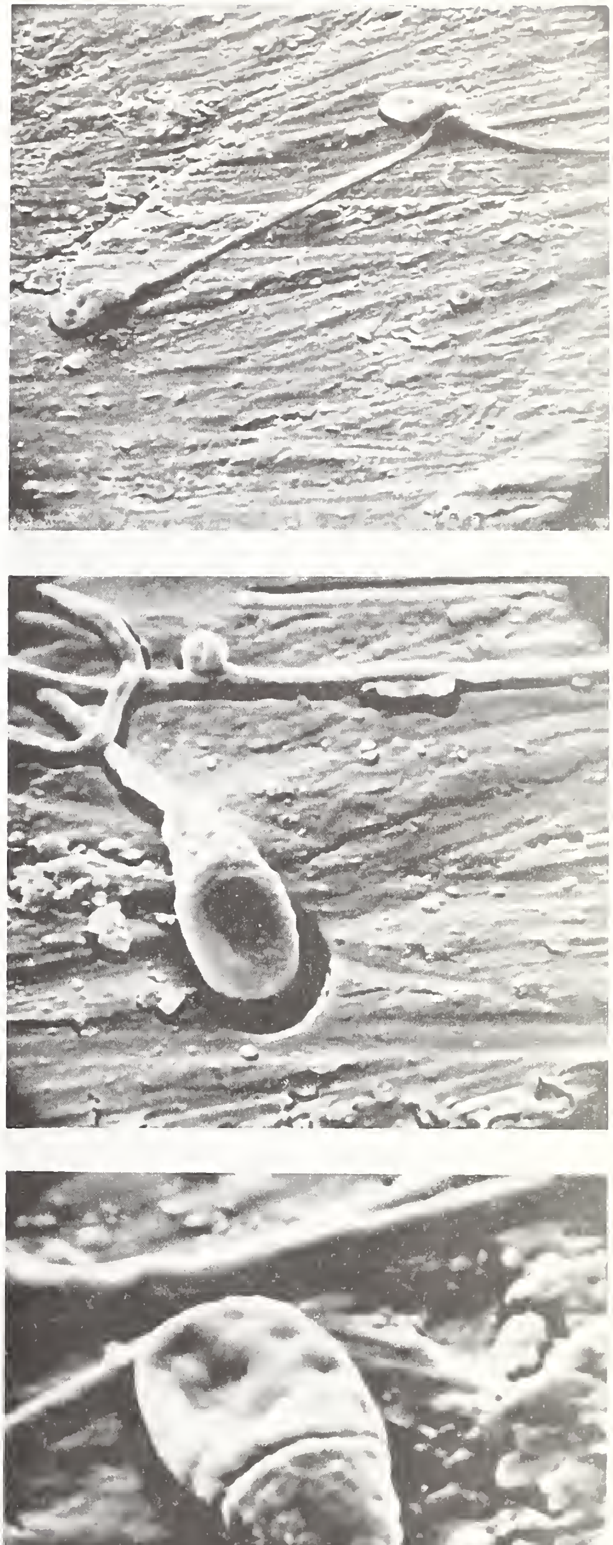
Photo Feature

MAGNIFIED PHOTOS SHOW HUMAN SPERM



Human spermatozoa were recently photographed by Lourens J. Zaneveld, M.D., of the University of Chicago. Dr. Zaneveld made photos at three magnifications: X 2,000 (top), X 5,500 (center), and X 11,000 (bottom). His NIH-funded research includes studies of the structure of human spermatozoa. Greater knowledge of sperm structure will aid understanding of the process of fertilization.

Only a small portion of the tail is shown in each photo. The head is essentially oval in shape and possesses many ridges and grooves on the posterior. The anterior portion of the head contains a depression and is flattened. In the bottom photo, the most apparent groove is thought to be the equatorial segment that limits the cap-like acrosome posteriorly. Studies of sperm and seminal fluid are supported by the National Institute of Child Health and Human Development. (NIH Photo #979)

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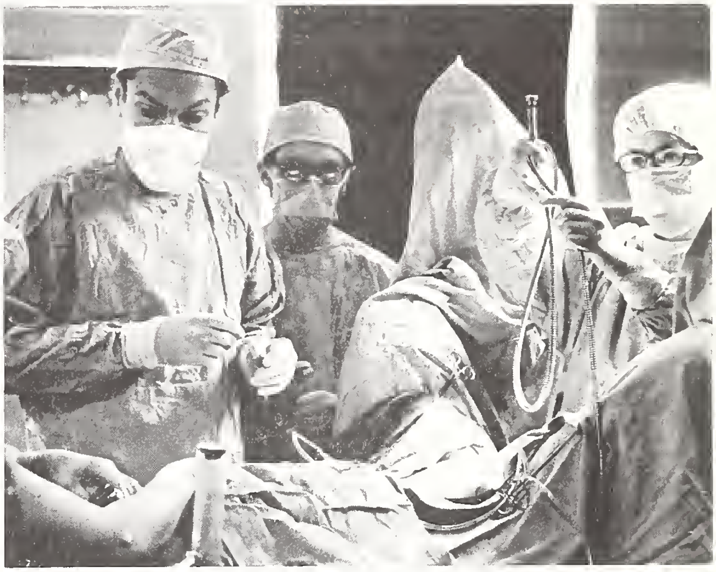
NEWS & FEATURES From NIH

December 10, 1972

Photo Feature

Requires No Major Surgery...

POPULATION RESEARCH CENTER SURGEON USES NEW STERILIZATION TECHNIQUE



Using a laparoscope inserted through a small incision below the navel, a surgeon can visually locate the fallopian tubes inside a patient's abdomen and observe as a specially equipped forceps--which has been inserted through a second small incision--is used to cut and then electrically cauterize (burn) the tubes. This ten-minute sterilization procedure is performed at the Chicago Lying-in Hospital by Dr. Luis A. Cibils (above left), an obstetrician in the Population Research Center at the University of Chicago. The laparoscopy procedure of tubal ligation requires a hospital stay of only one or two days. Traditional tubal ligation requires major surgery and up to six days stay in the hospital. The cost of laparoscopy is one-third to half the cost of traditional major surgery. In left photo, Dr. Cibils is instructing a resident performing tubal ligation on patient who had voluntarily requested the operation. The Population Research Centers are supported by grants from the National Institute of Child Health and Human Development. (NIH Photos #980 (above) and #981 (left).)

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Research Advances

ADVANCED RADIOLOGICAL METHODS EVALUATED AT TWO NEW CENTERS

Scientists at two new centers for diagnostic radiology research are working to improve technologies for visualizing tissues and organs. They also seek to apply advanced radiological techniques to the investigation of disease processes.

The centers, supported by the National Institute of General Medical Sciences, are at the University of Chicago and the Harvard Medical School. Kurt Rossmann, Ph.D., directs the Chicago center, while Herbert Abrams, M.D., is head of the Harvard center.

In the Chicago center, studies in nuclear imaging are facilitated by the University's cyclotron and related research supported by the Atomic Energy Commission. Using ammonia labeled with the short-lived radioisotope 13_N produced in the cyclotron, the investigators have produced scintillation camera images of heart muscle which are remarkably free of image blurring or diffuseness caused by the surrounding or contained blood. Preliminary data from animal and clinical studies suggest that the technique may also be useful to other areas of investigation, particularly in brain imaging, due to the radioisotope's affinity for selected tissues and rapid blood clearance.

Acute kidney failure, caused by shock, liver disease, or toxic agents, is a disease process under study at the Harvard Center. In such patients, blood flow through the kidney cortex is markedly impaired as a result of vasoconstriction of small vessels. By following the washout of radioactive

(more)

xenon gas from the kidney as a means to investigate these effects, the researchers hope to reverse the constriction by direct infusion of vasodilators into the renal arteries, and to determine safe and appropriate dosages of the therapeutic agents.

Evaluation of radiological techniques is conducted by Kurt Rossmann, Ph.D. who heads the NIH-funded center for diagnostic radiology at the University of Chicago. In the upper photo, he is checking apparatus for measuring the X-ray quantum (radient energy) noise that is recorded on radiographs. In the photo at right, Dr. Rossmann is using X-ray slit exposures to determine the optical quality of radiographic imaging systems. (NIH Photos #982 and 983)

#

NEWS & FEATURES From NIH December 10, 1972

Medical News Tip

Note to Subscribers:

The NIH Director, Robert Q. Marston, M.D., made a major speech on the subject of clinical experimentation during the November 10 dedication of two new buildings at the University of Virginia Medical School, Charlottesville. His talk, *Medical Science, The Clinical Trial and Society*, is summarized here.

BETTER PROTECTION URGED FOR HUMAN SUBJECTS IN RESEARCH--"There is immorality in *not* carrying out necessary research involving human subjects," declared Robert Q. Marston, M.D., but the NIH Director called for measures to strengthen the protection of individuals involved in clinical trials.

Dr. Marston stated that clinical research is necessary because there may not be a suitable animal model for a particular disease; because even where animal experimentation is possible, there is a point where tests must be carried out in man; and because the experimental method is the only way to test procedures and therapies which are already in use.

Dr. Marston reviewed existing NIH guidelines for protection of the rights and welfare of human subjects. He emphasized the effectiveness of these guidelines while he outlined plans for stronger safeguards for research involving human subjects especially under conditions where informed consent is difficult to obtain.

He proposed new regulations covering research in prisons and hospitals for the mentally ill and mentally retarded which would assure adequate safeguards against risks and require informed consent by the subject or his personal legal representative. The regulations would also prohibit undue inducement such as altering the conditions of confinement or offering unusually high financial compensation.

(more)

In addition, research at hospitals for the mentally ill and mentally retarded would be limited to conditions directly related to mental illness or retardation.

Dr. Marston announced that new guidelines will be discussed at a series of workshops planned to begin in February at Bethesda. The workshops will bring together research scientists, research administrators, lawyers, clergymen, and other specialists. He said, however, that he would initiate some of his proposed changes at NIH even before discussions are completed.

He also announced three other actions: (1) Staff review of legislative proposals and recommendations made by experts in this field and implementation of those ideas which can be adopted by administrative action;
(2) Examination of ways to provide fair and equitable compensation of subjects of clinical research who despite all precautions are harmed as a result; and (3) Requiring special justification in terms of significant benefit to humanity for those research studies in which participants are exposed to significant risk when they themselves do not have a reasonable chance of benefitting from the experiments.

Dr. Marston said "Good science and high standards of ethics are closely linked. Indeed, the presence of risk places a special demand on us that only the highest quality of research be tolerated."

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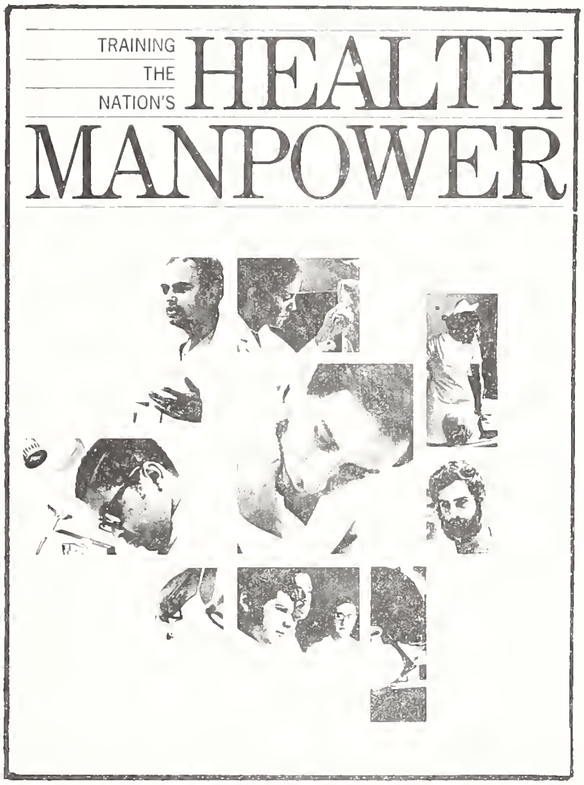
New Publication:
Training the Nation's Health Manpower

The Federal Government has spent more than $2 billion through the Bureau of Health Manpower Education (BHME) and its predecessors to increase the number of health personnel and improve their training. Hundreds of new and renovated training facilities and thousands of additional graduates have resulted from this effort. The quality of health education has been enhanced, but the Nation is still faced with critical health manpower problems, particularly in the underserved inner-city and rural areas.


TRAINING THE NATION'S HEALTH MANPOWER

Past efforts and current programs of the Bureau to train the Nation's health manpower are described in *Training the Nation's Health Manpower*. The new publication includes a history of the development of health manpower education legislation and a section listing BHME programs by title, description, and appropriation.

For a copy of *Training the Nation's Health Manpower*, contact:

Information Office, BHME
Bldg. 31, Room 5B-63
NIH, Bethesda, MD 20014
Phone: (301) 496-6011

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News Releases Issued

(Summaries of NIH releases sent out since the last issue. For a copy of any of these, please write or call.)

SUGAR SUBSTITUTE--As part of an intensive attack on tooth decay, the National Institute of Dental Research is supporting efforts to find a palatable, harmless substitute for sucrose in snack foods and desserts. Popular snack foods which have been modified by substituting other carbohydrates for the usual sugar will be studied by investigators at the University of Alabama School of Dentistry at Birmingham. The foods will first be tested on rats, which have been trained to human eating habits three meals a day with snacks three or four times in between. After 40 days, the rats will be examined for tooth decay and results will be compared with a control group of animals. If the results are satisfactory, clinical studies will be scheduled. The foods to be tested include ice cream, beverages, pies, cookies, cakes, confections, and jams from which the sucrose has been completely or almost totally removed.

COMPUTERS AND CLINICAL MEDICINE--The National Library of Medicine and the Bureau of Health Manpower Education will sponsor jointly a new training program of grant support to institutions to prepare health science professionals in the application of computer technology to health care information processing and health science education. The ultimate goal of this program is to promote the effective integration of computer technology into all phases of clinical medicine--teaching, practice, and research. Although initial emphasis will be placed on the recruitment of health science professionals already holding academic positions, students and postdoctorals who aspire to academic rank may also be included.

#

Editors of Publications May Request Glossy Prints of Numbered Photographs That Appear in the Regular Issue and NIH Portfolio on Minority Schools Biomedical Support.

NEWS & FEATURES From NIH
National Institutes of Health
Building 31, Room 2B-10
Bethesda, MD 20014

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NEWS&FEATURES FROM NIH

PORTFOLIO · MINORITY SCHOOLS BIOMEDICAL SUPPORT

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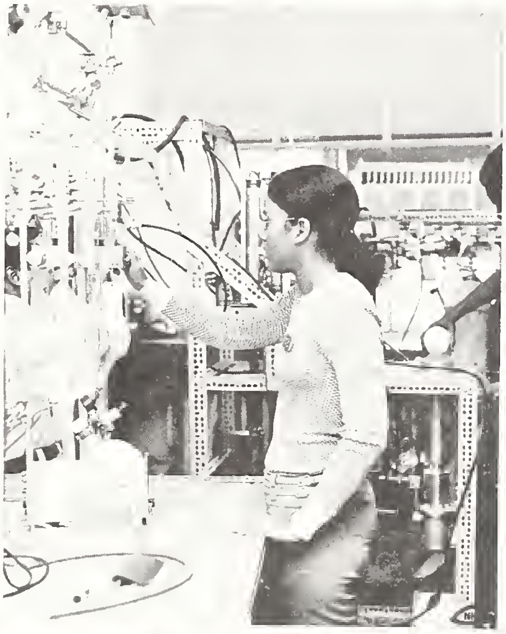
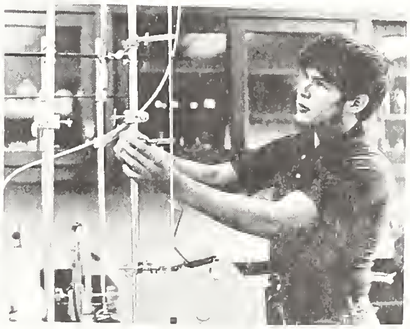




NEWS&FEATURES FROM NIH

NIH Portfolio on Minority Schools Biomedical Support Program....December 1972

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE ■ Public Health Service ■ National Institutes of Health ■ Office of Information ■ Bethesda, Maryland 200

NEWS & FEATURES From NIH Marc Stern, Editor, [301] 496-1206
Carol M. Sussman, Associate Editor

Press Contact: Jerry Gordon, Office of Information, Division of Research Resources, (301) 496-5545

MINORITY SCHOOLS BIOMEDICAL SUPPORT AWARDS
National Institutes of Health
Division of Research Resources
General Research Support Branch

Institution

- Alabama
  - Oakwood College (Huntsville)
- Delaware
  - Delaware State College (Dover)
- District of Columbia
  - Federal City College
  - Howard University
- Georgia
  - Albany State College (Albany)
  - Atlanta University Center
    - Clark College
    - Morehouse College
    - Morris Brown College
    - Spelman College
    - Atlanta University
- Hawaii
  - University of Hawaii at Hilo
- Illinois
  - Chicago State University (Chicago)
- Louisiana
  - Dillard University (New Orleans)
  - Southern University (Baton Rouge)
  - Southern University in New Orleans
  - Xavier University of Louisiana (New Orleans)
- Maryland
  - Coppin State College (Baltimore)
- Mississippi
  - Jackson State College (Jackson)
  - Rust College (Holly Springs)
- Missouri
  - Lincoln University (Jefferson City)
- New Mexico
  - New Mexico Highlands University (Las Vegas)
- North Carolina
  - Bennett College (Greensboro)
  - Johnson C. Smith University (Charlotte)
  - North Carolina A & T State University (Greensboro)
  - North Carolina Central University (Durham)
  - Shaw University (Raleigh)
  - Winston-Salem State University
- Ohio
  - Central State University (Wilberforce)
- Oklahoma
  - Southeastern State College (Durant)
- Pennsylvania
  - Cheyney State College (Cheyney)
  - Lincoln University (Lincoln)
- Puerto Rico
  - Catholic University of Puerto Rico (Ponce)
- South Carolina
  - South Carolina State College (Orangeburg)
- Tennessee
  - Fisk University (Nashville)
  - Meharry Medical College (Nashville)
- Texas
  - Bishop College (Dallas)
  - Pan American University (Edinburg)
  - Texas Southern University (Houston)
  - University of Texas at El Paso
- Virginia
  - Hampton Institute (Hampton)
  - Norfolk State College (Norfolk)
  - Virginia Union University (Richmond)

NEWS & FEATURES From NIH
PORTFOLIO SERIES
Building 31, Room 2B-10
Bethesda, MD 20014

INTRODUCTION: DRR FUNDS MINORITY SCHOOLS BIOMEDICAL SUPPORT PROGRAM

By Robert J. Gibbs, Ph.D.

Dr. Gibbs is Chief, General Research Support Branch, NIH Division of Research Resources. Dr. Gibbs joined NIH in 1964 as a Grants Associate, later serving as Operations Analysis Officer within the Office of the Director. A native of New York, he attended Fordham University where he received his Ph.D. in Chemistry. While at Fordham, he received an Atomic Energy Commission predoctoral fellowship. Dr. Gibbs was a research associate and staff member successively at the University of Virginia Medical School and the Massachusetts Institute of Technology. He has also previously been a research chemist for the Department of Agriculture.

The Minority Schools Biomedical Support program of the Division of Research Resources is designed to strengthen the capabilities for biomedical research in institutions of higher learning with predominantly ethnic minority student bodies. It constitutes part of the concerted effort by the National Institutes of Health to involve minority school scientists in biomedical research and to offer research training to minority students.

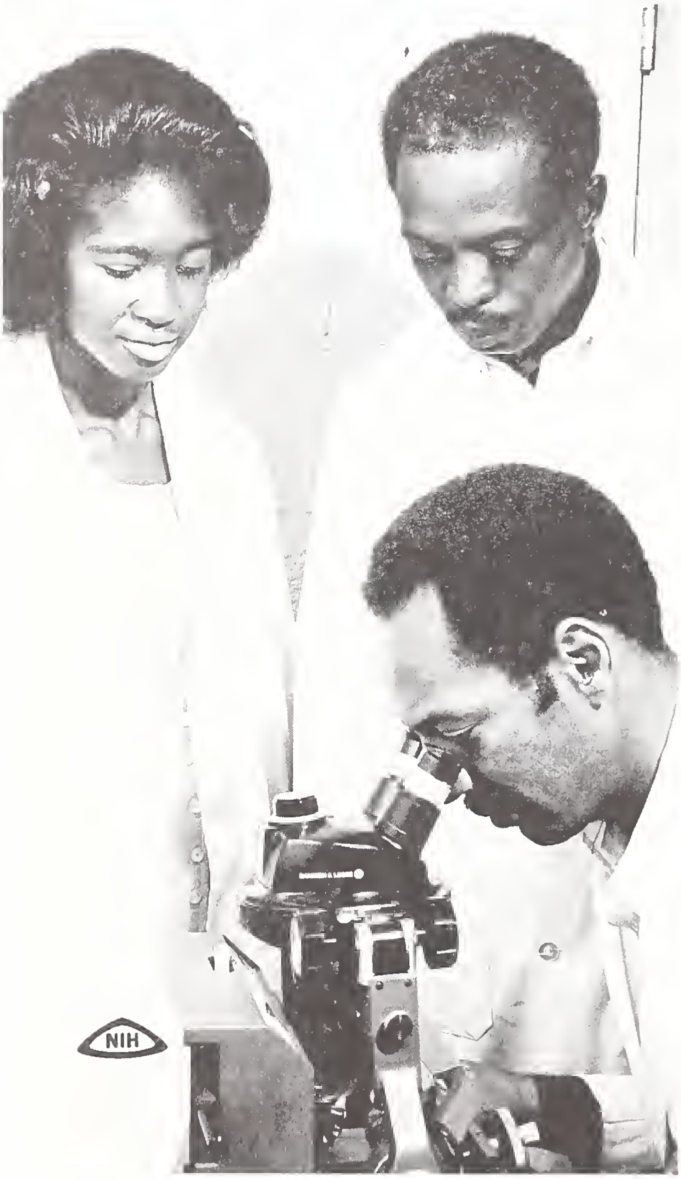
The program provides institutional support for biomedical research and research training. Funds awarded under this program may be used for a broad range of biomedically-oriented purposes, including the support of faculty "release time;" biomedical research programs; salaries of research personnel including undergraduate and graduate students as research or laboratory assistants; research training programs; undergraduate, graduate, and postgraduate research trainees; research resources; and consortia biomedical programs.

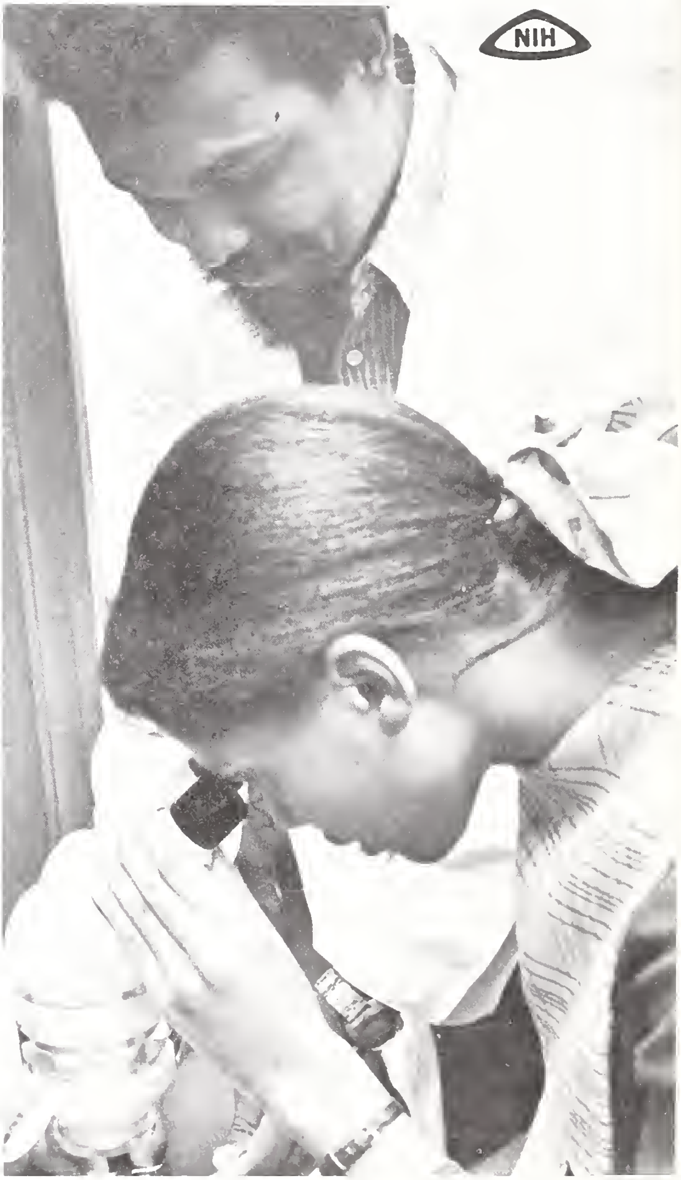
DIVISION of RESEARCH RESOURCES

This Portfolio shows how scientists and trainees are involved in biomedical research activities at a number of the schools participating in the program. The complete list of institutions currently receiving MSBS grants--including 32 Black schools, a predominantly American Indian college, a Hawaiian school, a Puerto Rican school, and three Chicano schools--is contained in this Portfolio *(page two).*

NIH is an agency of the U.S. Department of Health, Education, and Welfare.

ALBANY, GA--As part of a study of the effects of certain drugs on major organs of mice, Dr. Marion E. Jones (seated) checks a microscope slide. With him are Ruby L. Williams, a research trainee, and Dr. Edwin A. Green. They are working at Albany State College with funds from the Minority Schools Biomedical Support program of the NIH Division of Research Resources. (NIH Photo #M-2)

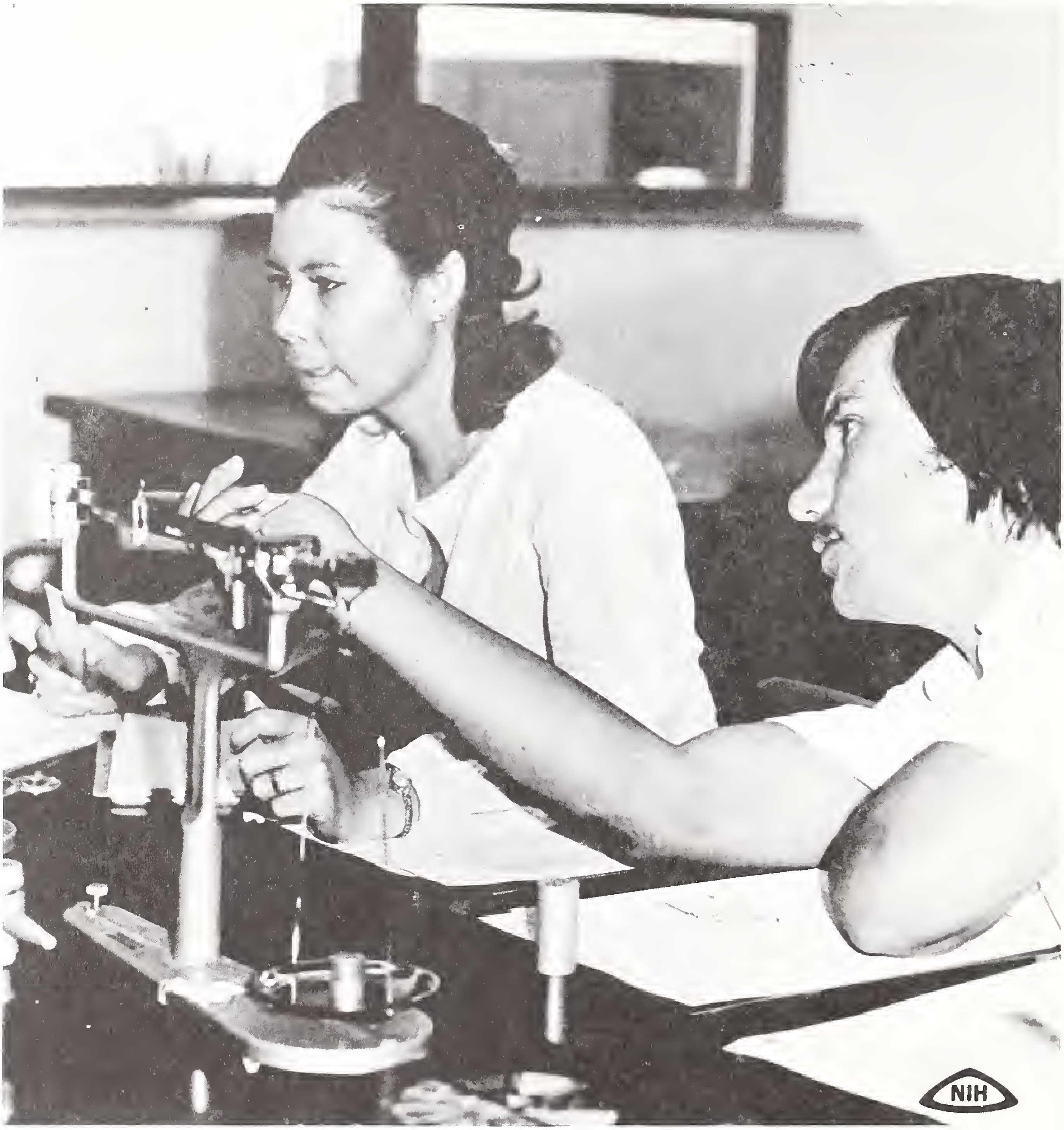




ATLANTA, GA--At the Atlanta University Center, Dr. John Browne is helping Sandra English, a research trainee, determine the effects of fluid and electrolyte imbalance on development in avian and mammalian embryos. This work is part of the Minority Schools Biomedical Support program of the NIH Division of Research Resources. The participating institutions within the Atlanta University Center are Atlanta University, Clark College, Morehouse College, Morris Brown College, and Spelman College. The Center was awarded the largest grant in the MSBS program. (NIH Photo #M-3)

CHARLOTTE, NC--Dr. A. Jean Hitzeman (right) works with Vara Smith, junior trainee, on techniques for the proper care of laboratory animals at Johnson C. Smith University. The women are in the Minority Schools Biomedical Support program of the NIH Division of Research Resources. (*NIH Photo #M-4*)

DURANT



DURANT, OK--These two trainees are among the young people of American Indian descent who are participating in the Minority Schools Biomedical Support program at Southeastern State College. They are Wilma Stevenson (left) of Creek Indian descent and Laird Rochelle who is of Chickasaw/Choctaw Indian descent. The MSBS program is supported by the NIH Division of Research Resources. (NIH Photo #M-5)

GREENSBORO, NC--Participants in the Minority Schools Biomedical Support program at North Carolina Agricultural and Technical State University include Professor Ved Gupta (left), Claude Griffin (center) and Alex Jordan. They are shown using a multiplexer to record data in digital form. The MSBS program is supported by the NIH Division of Research Resources. (NIH Photo #M-6)

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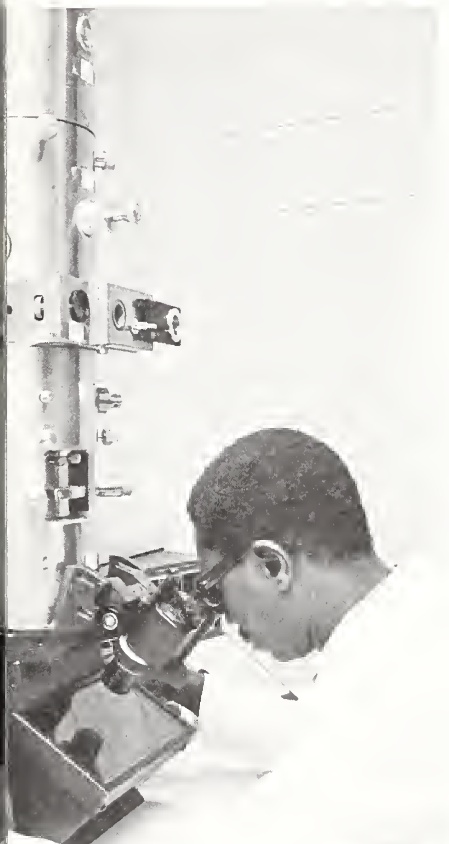

URES From NIH
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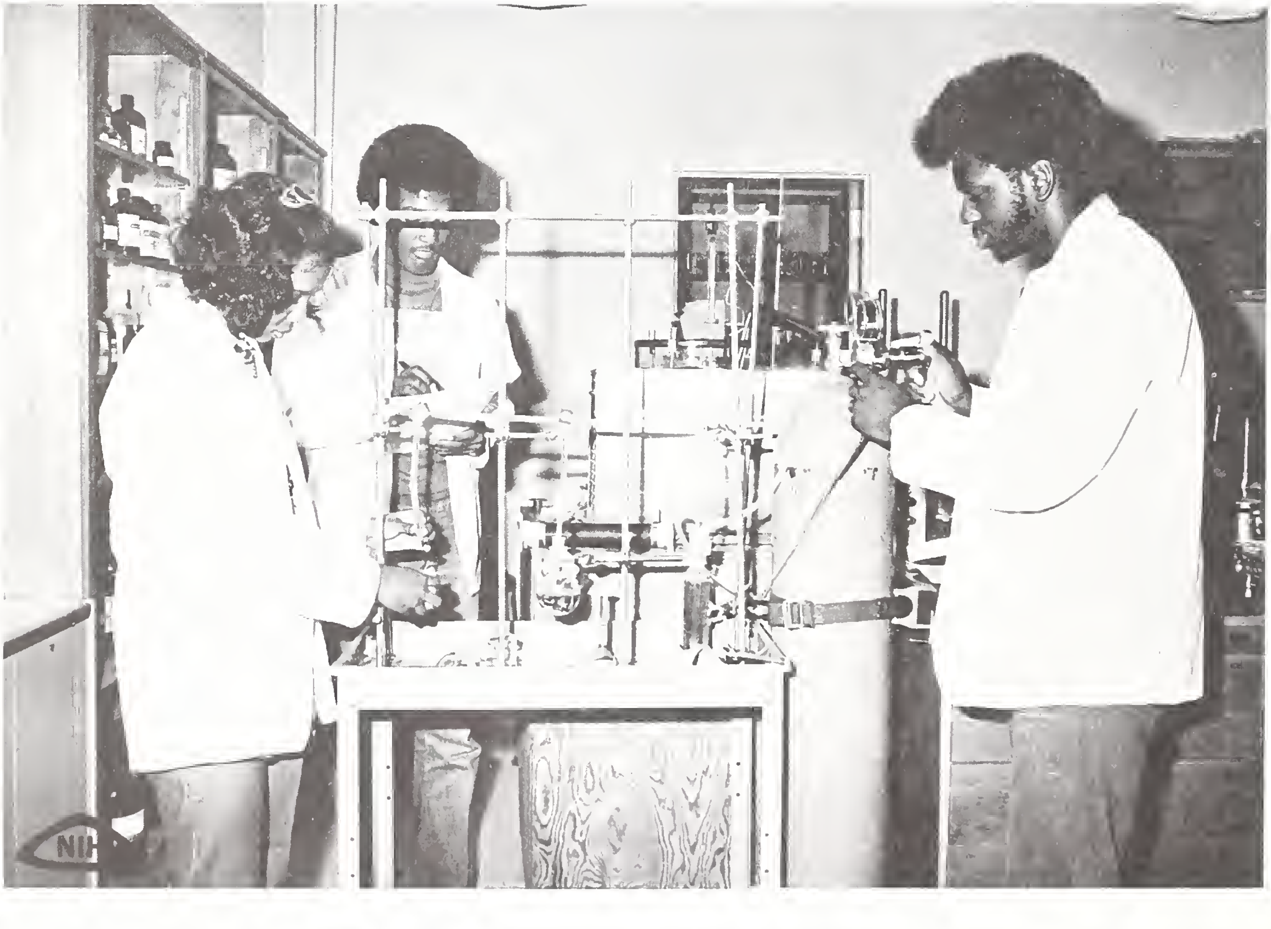
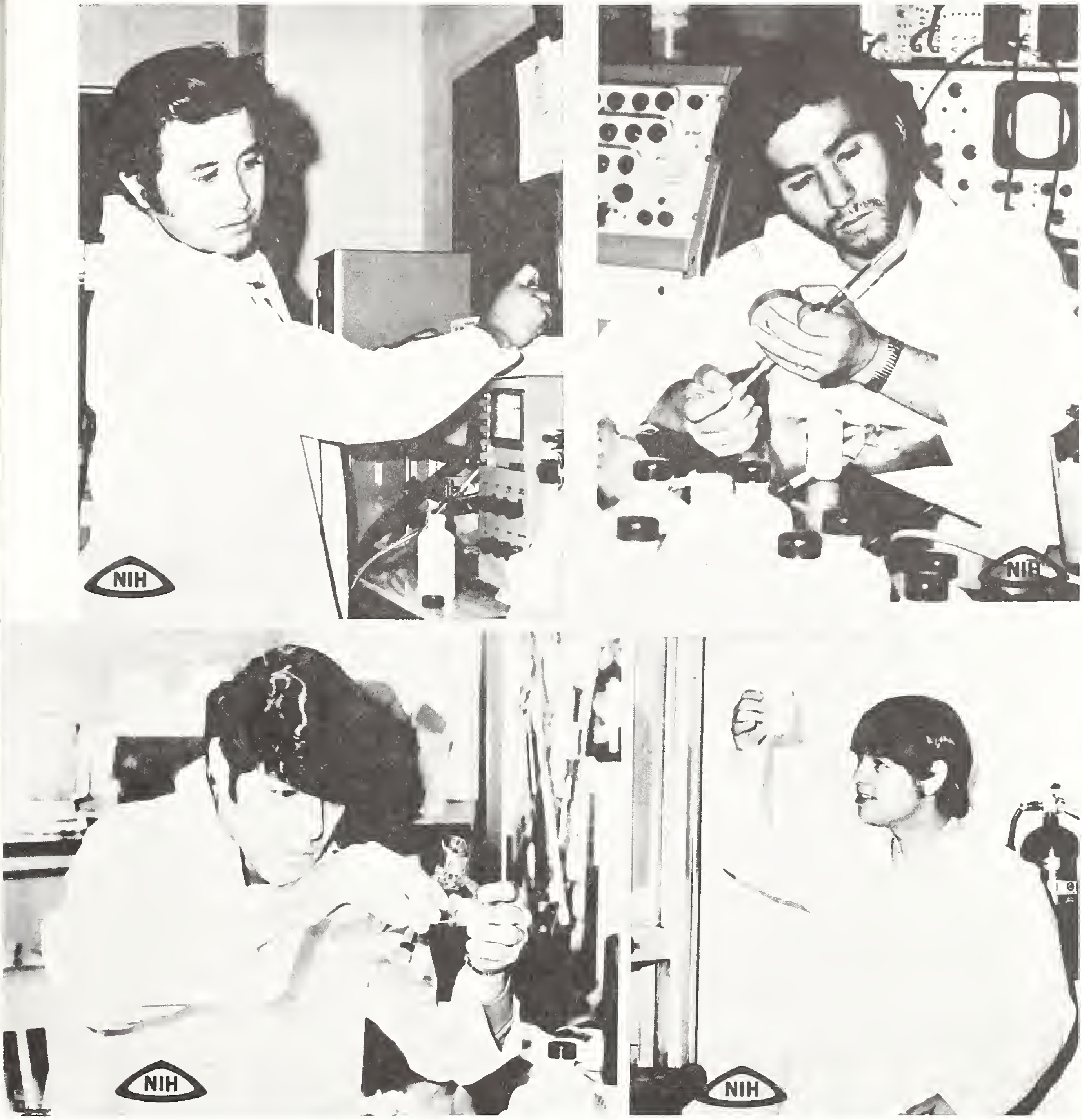
31, Room 2B-10

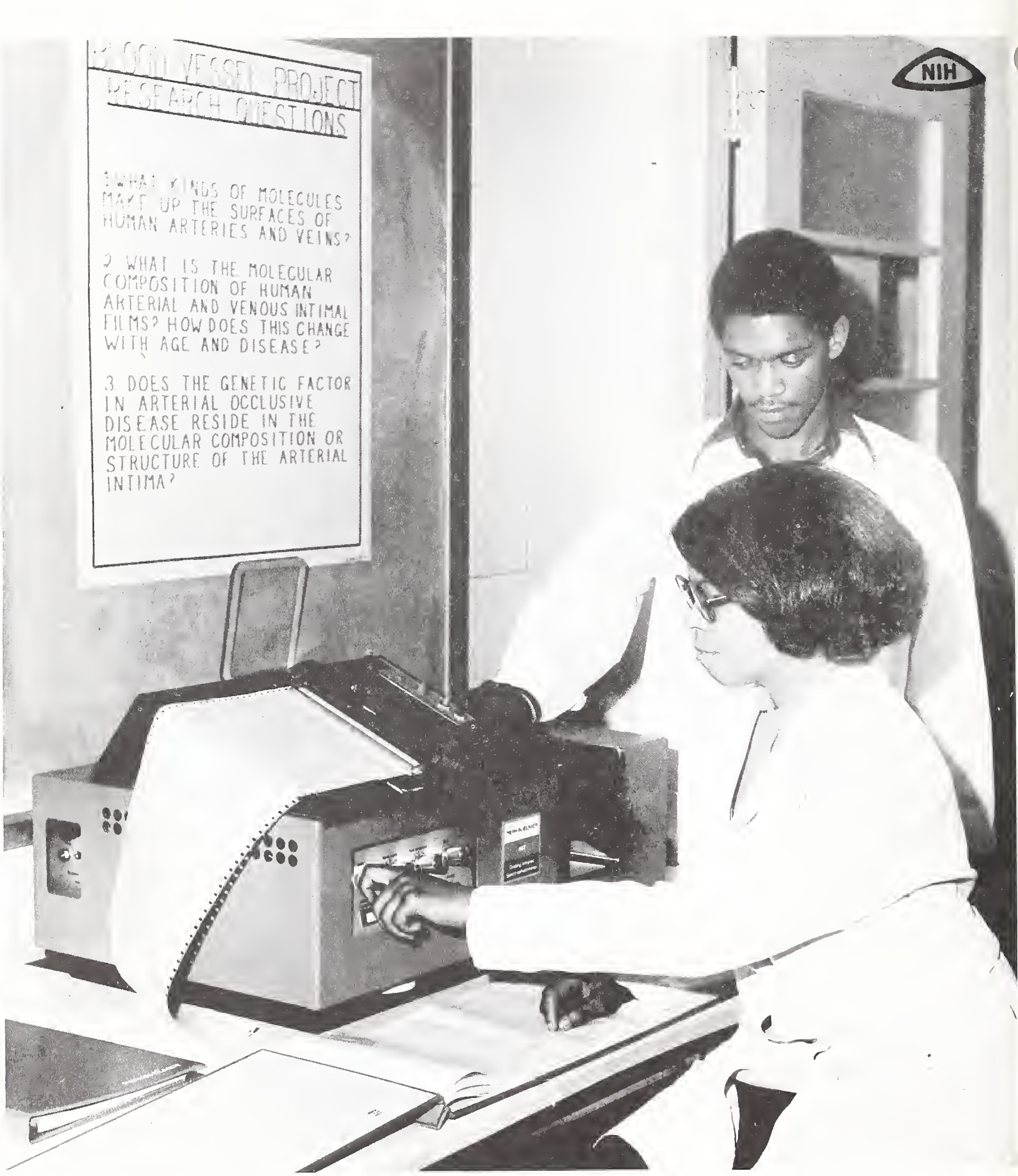
HILO, HI--Harrilyn Chun-Akana is shown engaged in a biology research project at the University of Hawaii. Her laboratory research work is part of the Minority Schools Biomedical Support program of the NIH Division of Research Resources. (NIH Photo #M-7)



JACKSON, MS--Three trainees are shown doing research at Jackson State College under the Minority Schools Biomedical Support program of the NIH Division of Research Resources. The students are (from left) Patric A. Ray, Cass D. Parker, and Jimmie Williams. (NIH Photo #M-8)



LAS VEGAS, NM--At New Mexico Highlands University, the Minority Schools Biomedical Support program includes (from top left) Henry Martinez, Patrick R. Montoya, David E. Maestas, and James Collins. The MSBS program is supported by the NIH Division of Research Resources. (NIH Photo #M-9, #M-10, #M-11, #M-12)


BLOOD VESSEL PROJECT
RESEARCH QUESTIONS
1. WHAT KINDS OF MOLECULES MAKE UP THE SURFACES OF HUMAN ARTERIES AND VEINS?
2. WHAT IS THE MOLECULAR COMPOSITION OF HUMAN ARTERIAL AND VENOUS INTIMAL FILMS? HOW DOES THIS CHANGE WITH AGE AND DISEASE?
3. DOES THE GENETIC FACTOR IN ARTERIAL OCCLUSIVE DISEASE RESIDE IN THE MOLECULAR COMPOSITION OR STRUCTURE OF THE ARTERIAL INTIMA?
NIH

LINCOLN, PA--At Lincoln University, Connie Williams and Tommy Johnson are shown running infrared spectra on human aortic intimal films. The research trainees are in the Minority Schools Biomedical Support program of the NIH Division of Research Resources. (NIH Photo #M-13)

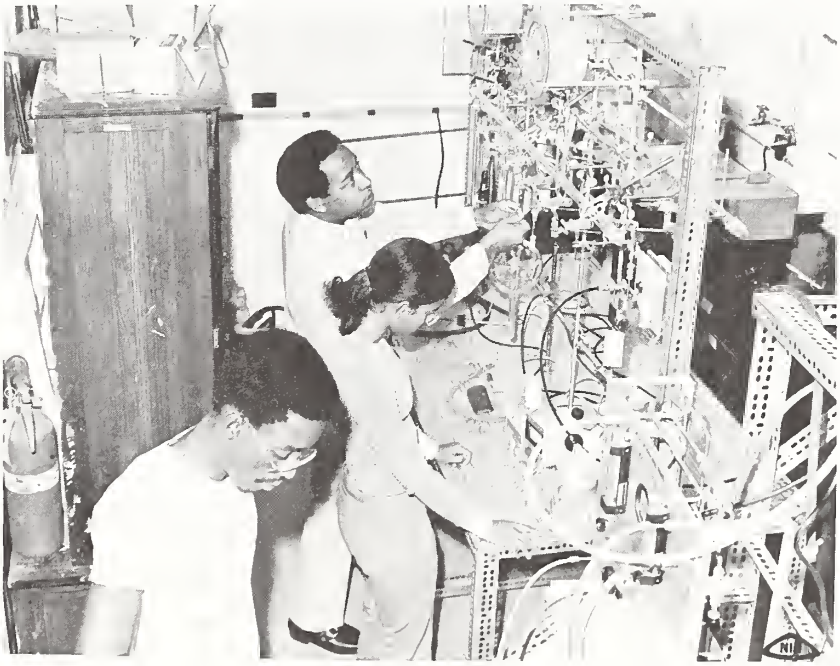
NASHVILLE

NASHVILLE, TN--At Meharry Medical College, Mary Harris is checking for significant data on the read-out of the gas chromatograph. She is in the College's Biochemistry Department. Her training is part of the Minority Schools Biomedical Support program of the NIH Division of Research Resources. (NIH Photo #M-14)

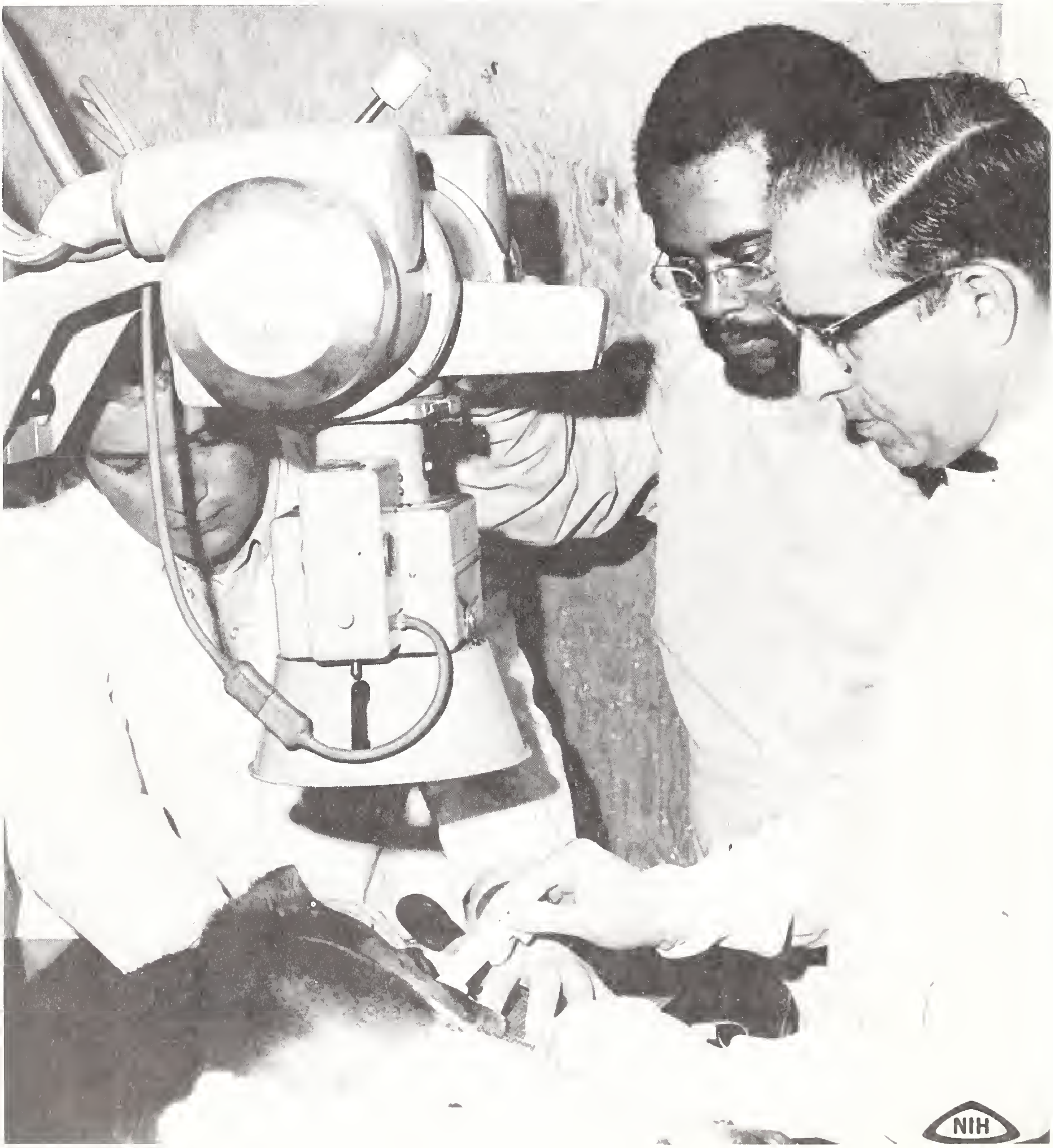
NEW ORLEANS, LA--At Dillard University, Dr. Joyce Verrett (right) guides Nelwyn Green, a trainee, on the methods of dissecting the frontal ganglion of an American cockroach. This work is part of the Minority Schools Biomedical Support program of the NIH Division of Research Resources. (NIH Photo #M-15)

NEW ORLEANS, LA--Rebecca Chaisson is preparing an assay on total proteins of animals under a photoperiod regimen at Xavier University. She is in the Minority Schools Biomedical Support program of the NIH Division of Research Resources. (NIH Photo #M-16)

NORFOLK, VA--At Norfolk State College, two science research trainees in the Minority Schools Biomedical Support program are Jared W. Flood (left) and Barbara J. Quince. The program is funded by the NIH Division of Research Resources. (NIH Photo #M-17)



ORANGEBURG, SC--The Minority Schools Biomedical Support program at South Carolina State College includes Darrish Barnette (left) and Melissa Evans (right) who are receiving instruction from Dr. Roy J. Isabel (center). Dr. Isabel, an Assistant Professor of Chemistry, is demonstrating vacuum techniques and cryogenic refrigeration methods. The program is supported by the NIH Division of Research Resources. (NIH Photo #M-18)



WASHINGTON, DC--At Howard University, Dr. Khodabakhsh Salamat (right) and research trainees take X-rays of an animal's jaw. The men are in the Minority Schools Biomedical Support program of the NIH Division of Research Resources. (NIH Photo #M-19)

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